# APPENDIX F

# TRANSPORTATION IMPACT ANALYSIS

*PREPARED BY:*
**HEXAGON TRANSPORTATION CONSULTANTS**

**SEPTEMBER 2006**

# East Sunnyvale
# Industrial-to-Residential

## Draft Transportation Impact Analysis

*Prepared for:*

The City of Sunnyvale

*Prepared by:*

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July 20, 2006
(Revised September 19, 2006)

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# Table of Contents



## Appendices



## List of Tables



## List of Figures

# Executive Summary

This report presents the results of the traffic impact analysis (TIA) conducted for the proposed conversion of light industrial land uses to residential development on approximately 129 acres of land in Sunnyvale, California. The 129-acre site is generally bordered by Duane Avenue, Stewart Drive, Britton Avenue and Lawrence Expressway (see Figure 1). The proposed General Plan designation would be ITR – Industrial-to-Residential. The ITR combining district was created in 1993 to specifically identify commercial and light industrial areas that would be appropriate for transition to residential uses. The ITR designation on these sites allows for the continuation or expansion of existing light industrial and commercial uses, as well as the construction of new low-medium-, medium-, and high-density residential housing. On the General Plan Amendment (GPA) site, the conversion to residential uses would be implemented with the R-2 (Low-Medium Density Residential, 10 to 12 DU/AC), R-3 (Medium Density Residential, 13 to 24 DU/AC), and R-4 (High Density Residential, 25 to 36 DU/AC) and Retail zoning designations.

Three GPA land use scenarios were analyzed for potentially significant impacts for the year 2020. Year 2020 baseline volumes were developed using the City of Sunnyvale's transportation model. The raw forecast volumes were refined to produce peak hour turning-movement volumes at the study intersections. GPA Scenario 1 – full buildout of the site – involves converting 129.23 acres of light industrial uses to 119.66 acres of residential development (R-3 and R-4 zoning), plus 9.57 acres of commercial development. Scenario 1 would result in 2,842 new dwelling units and 104,220 square feet (s.f.) of retail development. GPA Scenario 2 – reduced density alternative – involves converting 129.23 acres of light industrial uses to 119.66 acres of residential development at a lower overall density (R-2 and R-3 zoning), plus 9.57 acres of commercial development. Scenario 2 would result in 1,395 new dwelling units and 104,220 square feet (s.f.) of retail development. GPA Scenario 3 – smaller site alternative – involves converting 84.11 acres of light industrial uses to 84.11 acres of residential development (R-3 and R-4 zoning), which would result in 2,049 new units.

This report also includes a near-term impact analysis conducted for two proposed residential projects located within the ITR conversion area. One of the two proposed near-term projects, a 250-unit townhouse development, would be constructed on the currently vacant 14-acre AMD site located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection. Access to this project site would be provided via Duane Avenue and DeGuigne Drive. The second proposed near-term project is a Taylor-Woodrow project that would consist of a mix of condominiums and townhouses

totaling 304 units. This proposed project would replace approximately 111,300 s.f. of existing light industrial uses on a 7.3-acre site located in the northeast quadrant of the Stewart Drive and Duane Avenue intersection. Access to the Taylor-Woodrow project site would be provided via Duane Avenue and Duane Court.

The potential impacts related to the proposed development were evaluated following the standards and methodologies set forth by the City of Sunnyvale and the Santa Clara Valley Transportation Authority (VTA). The VTA administers the County Congestion Management Program (CMP). The traffic study includes an analysis of AM and PM peak hour traffic conditions for 33 signalized intersections. The study also includes a freeway segment capacity evaluation for 6 freeway segments.

## Trip Generation and Distribution

Through empirical research, data have been collected that correlate to common land uses their propensity for producing traffic. Thus, for the most common land uses there are standard trip generation rates that can be applied to help predict the future traffic increases that would result from a new development. The magnitude of traffic added to the roadway system by a particular development is estimated by multiplying the applicable trip generation rates by the size of the development. The standard trip generation rates are published in the Institute of Transportation Engineers (ITE) manual entitled *Trip Generation*, Seventh Edition, 2003.

### *Near-Term Project Trip Generation*

The 250-unit townhouse development would be constructed on the currently vacant 14-acre AMD site located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection. The 304-unit Taylor-Woodrow condominium/townhouse development would replace the existing light industrial uses currently on the 7.3-acre site located in the northeast quadrant of the Duane Avenue and Stewart Drive intersection. Therefore, the trips generated by the existing light industrial uses were estimated and subtracted at each intersection before project trips were added to the roadway network.

After applying the standard trip generation rates to the proposed residential developments, it is estimated that the developments would generate 3,246 gross daily vehicle trips, with 244 gross trips occurring during the AM peak hour and 288 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, the projects would generate 2,343 net daily trips, with 106 new trips occurring during the AM peak hour and 167 new trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the residential projects would produce 73 fewer inbound and 179 new outbound trips during the AM peak hour, and 175 new inbound and 8 fewer outbound trips during the PM peak hour.

### *GPA Scenario 1 Trip Generation*

The GPA Scenario 1 would generate 21,129 gross daily vehicle trips, with 1,359 gross trips occurring during the AM peak hour and 1,869 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, GPA Scenario 1 would generate 5,150 net new daily trips, with 1,084 fewer trips occurring during the AM peak hour and 259 fewer trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the GPA Scenario 1 would produce 1,749 fewer inbound and 665 new outbound trips during the AM peak hour, and 859 new inbound and 1,118 fewer outbound trips during the PM peak hour.

### GPA Scenario 2 Trip Generation

The GPA Scenario 2 would generate 12,650 gross daily vehicle trips, with 722 gross trips occurring during the AM peak hour and 1,116 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, GPA Scenario 2 would generate 3,329 net fewer daily trips, with 1,721 fewer trips occurring during the AM peak hour and 1,012 fewer trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the GPA Scenario 2 would produce 1,858 fewer inbound and 137 new outbound trips during the AM peak hour, and 355 new inbound and 1,367 fewer outbound trips during the PM peak hour.

### GPA Scenario 3 Trip Generation

The GPA Scenario 3 would generate 12,007 gross daily vehicle trips, with 902 gross trips occurring during the AM peak hour and 1,066 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, GPA Scenario 3 would generate 1,607 net new daily trips, with 688 fewer trips occurring during the AM peak hour and 319 fewer trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the GPA Scenario 3 would produce 1,167 fewer inbound and 479 new outbound trips during the AM peak hour, and 506 new inbound and 825 fewer outbound trips during the PM peak hour.

### Near-Term Project and Long-Range GPA Trip Distribution

The trip distribution pattern for the existing light industrial uses is based on a select zone analysis of the City of Sunnyvale 2020 transportation model. The peak hour trips generated by the existing light industrial uses were subtracted from each of the study intersections based on this distribution pattern before the estimated near-term project and long-range GPA scenario trips were added. The peak hour trips generated by the near-term and long-range residential developments were then assigned to the roadway network in accordance with the residential trip distribution pattern, which also is based on a select zone analysis of the City of Sunnyvale 2020 transportation model.

## Intersection Level of Service Impacts

Table ES-1 summarizes the results of the signalized intersection level of service analysis under near-term project conditions and long-range GPA conditions.

### Near-Term Project

The results of the level of service analysis show that, measured against City of Sunnyvale standards, none of the signalized study intersections would be significantly impacted by the near-term projects.

According to CMP standards, both CMP study intersections would operate at acceptable levels of service (LOS E or better) during the AM and PM peak hours under near-term project conditions.

### Long-Range GPA Scenarios

The results of the intersection level of service analysis show that, measured against City of Sunnyvale standards, the following signalized study intersections would be significantly impacted by one or more of the GPA scenarios as indicated below:

- Fair Oaks Avenue and Arques Avenue – GPA Scenario 1, PM peak hour
- Stewart Drive and Duane Avenue – GPA Scenarios 1 and 3, PM peak hour

***Fair Oaks Avenue and Arques Avenue***

**Impact:** The level of service at this intersection would be LOS E under 2020 baseline conditions during the PM peak hour, and the added trips as a result of the long-range GPA Scenario 1 would cause the average critical delay to increase by more than 4 seconds and increase the V/C ratio by more than 0.01. Based on City of Sunnyvale of service impact criteria, this constitutes a significant impact.

**Mitigation:** The level of service impact could be mitigated by providing an exclusive eastbound right-turn lane. The possible mitigation includes reconstructing the eastbound leg of the intersection, which would entail removal of street parking, shifting and reducing the width of the travel lanes, and/or acquiring some right-of-way. Reconfiguring the eastbound leg would involve re-striping and traffic signal modifications. This mitigation measure would improve the intersection level of service to better than 2020 baseline conditions. The estimated cost for these intersection improvements are between $100,000 and $500,000.

***Stewart Drive and Duane Avenue***

**Impact:** The level of service at this intersection would be LOS F under 2020 baseline conditions during the PM peak hour, and the added trips as a result of either long-range GPA Scenario 1 or GPA Scenario 3 would cause the average critical delay to increase by more than 4 seconds and increase the V/C ratio by more than 0.01. Based on City of Sunnyvale of service impact criteria, this constitutes a significant impact.

**Mitigation:** The level of service impact could be mitigated by converting the westbound shared through/right-turn lane into an exclusive right-turn lane, and converting the shared through/left-turn lane into a shared left/through/right lane. This improvement would require signal modifications and re-striping only. No additional right-of-way would be required. This mitigation measure would improve the intersection level of service from LOS F to an acceptable LOS D. The estimated cost for this intersection improvement is $100,000. Project proponents will be required to contribute their proportionate fair share of funds to implement the necessary improvements. If this project is included in the update of the Transportation Impact Fee (TIF), then the mechanism for this contribution could be through payment of the updated Sunnyvale TIF. If the project is not included in the updated TIF, then the mechanism would be a proportionate contribution to the improvement in addition to payment of the TIF.

***Wolfe Road and Stewart Drive***

The level of service at this intersection would be LOS A under 2020 baseline conditions during the AM peak hour, and the added trips as a result of the long-range GPA Scenario 1 would cause the intersection level of service to worsen to LOS B. The City of Sunnyvale has a policy that reasonable improvements be considered if project traffic would degrade the LOS of an intersection by one letter grade. Although the level of service at this location would degrade to LOS B, the intersection would continue to operate very well. It is the opinion of the project traffic consultant that the expense of the improvements necessary to return the intersection LOS to A (additional turn lanes) are

not justified by the savings in travel time. For this reason, no further improvements are recommended at this location.

According to CMP standards, both CMP study intersections would operate at acceptable levels of service (LOS E or better) during the AM and PM peak hours under all three long-range GPA scenarios.

Note that the levels of service at some of the study intersections improve under the future GPA scenarios when compared to 2020 baseline conditions. This is because future GPA scenarios involve replacing light industrial uses with residential uses. As a result, the GPA site would experience fewer inbound trips in the AM and fewer outbound trips in the PM. The shift in travel patterns would result in lower approach volumes at some of the study intersections, which correspondingly improves the level of service.

## Signal Warrant Analysis

Peak hour signal warrant checks (*MUTCD 2003 Edition*, Part 4, Warrant 3) were performed for the unsignalized study intersections to determine whether signalization would be justified on the basis of near-term project, 2020 baseline, and GPA peak hour volumes. The analysis revealed that the unsignalized intersection of Wolfe Road and Maude Avenue would warrant signalization based on PM peak hour volumes under near-term project conditions, 2020 baseline conditions, and all three of the long-range GPA scenarios.

The City of Sunnyvale ultimately will make the determination as to whether or not signalizing this intersection would be necessary and appropriate. Thus, a more detailed study of this location may be necessary following the City's review of this operational issue. It should be noted that although the unsignalized intersection of Wolfe Road and Maude Avenue would warrant a signal based on near-term project, 2020 baseline, and all three GPA scenario peak hour traffic volumes, meeting the Caltrans volume warrant is not considered a significant adverse traffic impact according to CEQA guidelines. The other two unsignalized intersections would not meet the peak hour warrant.

## Freeway Segment Evaluation

The need to study freeway segments for the potential near-term project and GPA project scenarios was evaluated. According to CMP guidelines, a detailed freeway segment analysis should be conducted when a proposed development would add traffic to a freeway segment operating at LOS F equal to one percent of the segments' capacity or greater. The results of the freeway evaluation show that the near-term project scenario would not cause a significant increase in traffic volume (one percent or more of capacity) on any of the freeway segments in the study area. The GPA Scenario 1 would cause an increase of more than one percent on the segment of US 101 between Great America Parkway and Lawrence Expressway. However, this would not be considered a significant increase since this segment of US 101 currently is operating at LOS D during both the AM and PM peak hours. Neither GPA Scenario 2 nor GPA Scenario 3 would result in significant increases in traffic volume on any study freeway segment. Therefore, based on the results of the freeway segment capacity evaluation, a more detailed analysis of freeway segments is not required.

# Table ES- 1
# Intersection Level of Service Summary

| Intersection | Peak Hour | Existing Ave. Delay | Existing LOS | Background Ave. Delay | Background LOS | Near-Term Project Ave. Delay | Near-Term Project LOS | Near-Term Project Incr. In Crit. Delay. | Near-Term Project Incr. In Crit. V/C | 2020 Baseline Ave. Delay | 2020 Baseline LOS | GPA Scenario 1 Ave. Delay | GPA Scenario 1 LOS | GPA Scenario 1 Incr. In Crit. Delay. | GPA Scenario 1 Incr. In Crit. V/C | GPA Scenario 2 Ave. Delay | GPA Scenario 2 LOS | GPA Scenario 2 Incr. In Crit. Delay. | GPA Scenario 2 Incr. In Crit. V/C | GPA Scenario 3 Ave. Delay | GPA Scenario 3 LOS | GPA Scenario 3 Incr. In Crit. Delay. | GPA Scenario 3 Incr. In Crit. V/C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Java Dr. & Crossman Ave. | AM | 18.2 | B | 18.2 | B | 18.2 | B | -0.1 | 0.000 | 18.4 | B | 18.2 | B | 0.0 | 0.007 | 18.2 | B | 0.0 | 0.002 | 18.3 | B | 0.0 | 0.005 |
| | PM | 27.0 | C | 27.0 | C | 27.0 | C | 0.0 | 0.002 | 55.3 | E | 57.2 | E | 2.1 | 0.011 | 56.3 | E | 0.9 | 0.005 | 56.5 | E | 1.3 | 0.007 |
| Fair Oaks Ave. & Fair Oaks Way | AM | 18.7 | B | 21.5 | C | 21.5 | C | 0.0 | 0.002 | 29.9 | C | 30.6 | C | 0.7 | 0.010 | 30.2 | C | 0.3 | 0.004 | 30.3 | C | 0.5 | 0.007 |
| | PM | 20.1 | C | 19.8 | B | 19.8 | B | 0.0 | 0.002 | 21.7 | C | 22.3 | C | 0.5 | 0.008 | 22.0 | C | 0.2 | 0.004 | 22.1 | C | 0.3 | 0.005 |
| Fair Oaks Ave. & Tasman Dr. | AM | 19.4 | B | 19.3 | B | 19.3 | B | 0.0 | 0.002 | 29.9 | C | 30.0 | C | 0.2 | 0.010 | 29.9 | C | 0.1 | 0.004 | 30.0 | C | 0.1 | 0.007 |
| | PM | 26.3 | C | 26.4 | C | 26.5 | C | 0.0 | 0.002 | 40.7 | D | 41.7 | D | 1.4 | 0.010 | 41.2 | D | 0.6 | 0.005 | 41.4 | D | 0.9 | 0.007 |
| Fair Oaks Ave. & Weddell Dr. | AM | 13.3 | B | 13.2 | B | 13.2 | B | -0.1 | 0.001 | 13.2 | B | 12.2 | B | -1.3 | -0.017 | 12.1 | B | -1.3 | -0.023 | 12.5 | B | -0.9 | -0.011 |
| | PM | 22.1 | C | 21.8 | C | 21.8 | C | -0.1 | 0.001 | 18.8 | B | 17.9 | B | -1.5 | -0.013 | 17.9 | B | -1.5 | -0.017 | 18.0 | B | -1.2 | -0.012 |
| Fair Oaks Ave. & US 101 NB Ramps | AM | 22.5 | C | 24.3 | C | 24.4 | C | 0.2 | 0.006 | 26.9 | C | 26.8 | C | 0.3 | 0.015 | 26.4 | C | -0.6 | -0.008 | 26.8 | C | 0.1 | 0.008 |
| | PM | 26.0 | C | 29.8 | C | 30.1 | C | 0.4 | 0.004 | 63.8 | E | 62.1 | E | -3.1 | -0.006 | 57.8 | E | -8.8 | -0.023 | 62.6 | E | -2.2 | -0.005 |
| Fair Oaks Ave. & Ahwanee Ave. | AM | 16.8 | B | 16.4 | B | 16.3 | B | -0.1 | 0.005 | 18.4 | B | 19.0 | B | 0.6 | 0.026 | 18.8 | B | 0.2 | 0.008 | 18.7 | B | 0.3 | 0.016 |
| | PM | 15.4 | B | 15.1 | B | 15.1 | B | 0.0 | 0.004 | 14.2 | B | 14.2 | B | 0.0 | 0.020 | 14.2 | B | 0.0 | 0.009 | 14.2 | B | 0.0 | 0.012 |
| Fair Oaks Ave. & Caliente Dr. | AM | 11.4 | B | 10.9 | B | 10.9 | B | 0.0 | 0.006 | 10.3 | B | 10.8 | B | 0.5 | 0.026 | 10.6 | B | 0.1 | 0.008 | 10.6 | B | 0.3 | 0.017 |
| | PM | 7.9 | A | 7.8 | A | 7.7 | A | 0.0 | 0.004 | 8.6 | A | 8.8 | A | 0.4 | 0.020 | 8.7 | A | 0.2 | 0.009 | 8.7 | A | 0.2 | 0.011 |
| Fair Oaks Ave. & Duane Ave. | AM | 28.5 | C | 28.4 | C | 28.5 | C | 0.0 | -0.001 | 36.2 | D | 30.2 | C | -10.0 | -0.090 | 27.7 | C | -13.2 | -0.117 | 31.9 | C | -7.1 | -0.047 |
| | PM | 23.9 | C | 24.1 | C | 24.4 | C | 0.9 | 0.015 | 25.9 | C | 26.7 | C | 11.7 | 0.109 | 24.7 | C | 7.6 | 0.055 | 27.2 | C | 10.9 | 0.090 |
| Fair Oaks Ave. & Wolfe Rd. | AM | 20.7 | C | 21.0 | C | 21.0 | C | 0.1 | 0.002 | 23.8 | C | 23.1 | C | 0.0 | -0.005 | 23.0 | C | -0.5 | -0.018 | 23.7 | C | 0.1 | 0.001 |
| | PM | 17.9 | B | 18.3 | B | 18.4 | B | 0.1 | 0.003 | 29.4 | C | 30.3 | C | 1.0 | 0.004 | 28.5 | C | -1.6 | -0.012 | 30.2 | C | 0.9 | 0.005 |
| Fair Oaks Ave. & Maude Ave. | AM | 24.0 | C | 23.7 | C | 23.7 | C | 0.0 | -0.001 | 31.6 | C | 32.2 | C | 5.3 | 0.051 | 32.1 | C | 5.3 | 0.040 | 32.4 | C | 5.5 | 0.046 |
| | PM | 22.7 | C | 22.8 | C | 23.0 | C | 0.2 | 0.002 | 46.3 | D | 48.3 | D | 3.6 | 0.010 | 45.6 | D | -0.7 | -0.005 | 48.1 | D | 2.9 | 0.009 |
| Fair Oaks Ave. & Arques Ave. | AM | 22.6 | C | 24.4 | C | 25.9 | C | 5.3 | 0.048 | 31.5 | C | 31.6 | C | 8.4 | 0.042 | 29.8 | C | 6.6 | -0.002 | 31.9 | C | 8.8 | 0.043 |
| *With Mitigation* | | | | | | | | | | | | *30.7* | C | | | *29.0* | C | | | *30.9* | C | | |
| | PM | 31.9 | C | 32.5 | C | 33.3 | C | 1.2 | 0.018 | 56.5 | E | **60.9** | **E** | **4.6** | **0.024** | 54.2 | D | -6.0 | -0.021 | 58.1 | E | -0.3 | 0.006 |
| *With Mitigation* | | | | | | | | | | | | *49.9* | *D* | | | *46.2* | *D* | | | *48.7* | *D* | | |
| Fair Oaks Ave. & California Ave. | AM | 12.8 | B | 12.5 | B | 12.5 | B | 0.0 | -0.001 | 11.6 | B | 11.6 | B | -0.1 | -0.022 | 11.7 | B | -0.1 | -0.023 | 11.6 | B | -0.1 | -0.013 |
| | PM | 12.1 | B | 11.4 | B | 11.6 | B | 0.3 | 0.003 | 11.7 | B | 12.1 | B | 0.7 | 0.000 | 11.7 | B | 0.1 | -0.013 | 11.9 | B | 0.4 | 0.000 |
| Fair Oaks Ave. & Kifer Rd. | AM | 8.4 | A | 8.4 | A | 8.6 | A | 0.3 | 0.003 | 20.3 | C | 20.9 | C | 1.3 | -0.009 | 20.6 | C | 0.6 | -0.019 | 20.7 | C | 0.8 | -0.005 |
| | PM | 16.2 | B | 16.5 | B | 16.5 | B | 0.1 | 0.001 | 25.2 | C | 24.6 | C | -0.6 | 0.001 | 24.4 | C | -0.8 | -0.010 | 24.7 | C | -0.5 | -0.002 |
| Wolfe Rd. & Stewart Dr. | AM | 8.5 | A | 10.2 | B | 11.5 | B | 1.5 | 0.012 | 8.4 | A | 11.3 | B | 3.3 | 0.059 | 9.1 | A | 0.6 | 0.013 | 9.5 | A | 1.3 | 0.045 |
| | PM | 10.2 | B | 12.2 | B | 12.3 | B | 0.0 | 0.000 | 9.4 | A | 9.6 | A | -0.7 | -0.045 | 9.3 | A | -0.7 | -0.046 | 9.2 | A | -0.6 | -0.041 |
| Wolfe Rd. & Arques Ave. | AM | 18.7 | B | 19.7 | B | 20.0 | B | 0.1 | 0.000 | 33.4 | C | 25.1 | C | -14.4 | -0.074 | 24.6 | C | -15.2 | -0.087 | 25.9 | C | -13.9 | -0.067 |
| | PM | 21.2 | C | 22.4 | C | 22.5 | C | 0.1 | 0.005 | 33.5 | C | 30.3 | C | -4.7 | -0.008 | 29.5 | C | -5.7 | -0.029 | 30.4 | C | -4.7 | -0.030 |
| Wolfe Rd. & Central Expwy (N) | AM | 11.4 | B | 12.2 | B | 12.4 | B | 0.2 | 0.003 | 16.0 | B | 16.8 | B | 0.3 | 0.013 | 16.5 | B | -0.1 | 0.003 | 16.7 | B | 0.4 | 0.009 |
| | PM | 16.2 | B | 16.0 | B | 15.9 | B | 0.0 | 0.000 | 15.4 | B | 15.1 | B | 0.1 | -0.023 | 15.3 | B | 0.1 | -0.027 | 15.2 | B | 0.1 | -0.019 |
| Wolfe Rd. & Central Expwy (S) | AM | 8.6 | A | 9.0 | A | 9.0 | A | 0.0 | 0.000 | 19.6 | B | 19.7 | B | 0.0 | 0.001 | 19.9 | B | 0.0 | 0.001 | 19.6 | B | 0.0 | 0.000 |
| | PM | 16.2 | B | 16.2 | B | 16.2 | B | 0.0 | 0.000 | 15.3 | B | 15.6 | B | -0.3 | -0.032 | 15.6 | B | -0.3 | -0.039 | 15.4 | B | -0.2 | -0.025 |
| Wolfe Rd. & Kifer Rd. | AM | 20.8 | C | 21.5 | C | 21.5 | C | 0.0 | -0.001 | 210.1 | F | 183.9 | F | -30.5 | -0.036 | 184.1 | F | -32.3 | -0.044 | 191.5 | F | -21.3 | -0.026 |
| | PM | 31.1 | C | 31.3 | C | 31.5 | C | 0.5 | 0.005 | 84.8 | F | 76.8 | E | -11.9 | -0.031 | 74.9 | E | -14.0 | -0.037 | 78.4 | E | -9.2 | -0.024 |
| De Guigne Dr. & Duane Ave. | AM | 3.8 | A | 4.3 | A | 5.1 | A | 0.3 | 0.011 | 7.2 | A | 9.2 | A | 1.5 | -0.013 | 8.6 | A | 1.1 | -0.029 | 8.5 | A | 0.9 | 0.008 |
| | PM | 8.0 | A | 7.8 | A | 8.1 | A | 0.3 | 0.010 | 6.1 | A | 3.9 | A | -2.1 | -0.004 | 3.4 | A | -2.5 | -0.027 | 5.0 | A | -1.2 | -0.015 |
| Commercial St. & Arques Ave. | AM | 13.5 | B | 13.2 | B | 14.0 | B | 1.0 | 0.017 | 15.8 | B | 17.7 | B | 1.9 | 0.041 | 16.1 | B | 0.3 | -0.012 | 17.3 | B | 1.5 | 0.027 |
| | PM | 20.2 | C | 20.0 | C | 20.6 | C | 1.2 | 0.018 | 22.0 | C | 22.9 | C | 0.4 | 0.022 | 22.6 | C | 0.1 | 0.003 | 22.7 | C | 0.3 | 0.017 |
| Stewart Dr. & Duane Ave. | AM | 47.7 | D | 47.7 | D | 37.4 | D | -15.7 | 0.015 | 67.3 | E | 20.5 | C | -81.3 | -0.287 | 19.5 | B | -83.0 | -0.346 | 24.4 | C | -71.5 | -0.165 |
| *With Mitigation* | | | | | | | | | | | | *21.9* | *C* | | | *20.7* | C | | | *24.5* | *C* | | |
| | PM | 39.0 | D | 39.0 | D | 51.0 | D | 14.8 | 0.068 | 186.0 | F | **203.6** | **F** | **33.0** | **0.059** | 170.5 | F | -20.0 | -0.062 | **191.8** | **F** | **12.6** | **0.055** |
| *With Mitigation* | | | | | | | | | | | | *41.3* | *D* | | | *28.4* | *C* | | | *42.2* | *D* | | |
| Santa Trinita Ave. & Stewart Dr. | AM | 17.5 | B | 17.5 | B | 17.4 | B | 0.0 | 0.012 | 18.4 | B | 18.6 | B | 1.2 | 0.003 | 18.1 | B | 0.7 | -0.080 | 18.7 | B | 1.4 | -0.011 |
| | PM | 18.7 | B | 18.7 | B | 18.6 | B | -0.2 | 0.016 | 22.4 | C | 20.8 | C | -2.3 | -0.128 | 20.0 | C | -2.8 | -0.195 | 20.7 | C | -2.2 | -0.090 |
| Santa Trinita Ave. & Arques Ave. | AM | 9.8 | A | 9.9 | A | 9.9 | A | -0.2 | -0.005 | 10.5 | B | 10.7 | B | -0.1 | -0.024 | 10.4 | B | -0.5 | -0.043 | 10.6 | B | -0.1 | -0.009 |
| | PM | 16.6 | B | 16.3 | B | 16.2 | B | -0.3 | -0.005 | 14.5 | B | 9.9 | A | -6.3 | -0.133 | 9.5 | A | -6.6 | -0.145 | 10.8 | B | -4.9 | -0.087 |
| Lawrence Expwy. & Tasman Dr. | AM | 45.9 | D | 45.9 | D | 45.9 | D | 0.0 | -0.001 | 46.9 | D | 48.8 | D | -1.2 | -0.033 | 48.7 | D | -1.4 | -0.037 | 48.8 | D | -0.8 | -0.022 |
| | PM | 50.7 | D | 52.8 | D | 52.9 | D | 0.2 | 0.004 | 63.6 | E | 64.3 | E | -0.9 | 0.004 | 63.7 | E | -1.0 | -0.002 | 64.0 | E | -0.7 | 0.002 |
| Lawrence Expwy. & Lakehaven Dr. | AM | 61.7 | E | 61.1 | E | 61.0 | E | 0.0 | -0.001 | 50.1 | D | 48.2 | D | -2.2 | -0.006 | 48.3 | D | -2.1 | -0.015 | 48.8 | D | -1.4 | -0.003 |
| | PM | 60.3 | E | 59.3 | E | 59.3 | E | 0.0 | 0.002 | 59.7 | E | 62.0 | E | 1.4 | 0.012 | 61.0 | E | -0.2 | -0.001 | 61.1 | E | 0.7 | 0.007 |
| Lawrence Expwy. & US 101 NB Ramps | AM | 15.7 | B | 16.7 | B | 16.6 | B | -0.1 | 0.000 | 18.3 | B | 17.4 | B | -0.2 | -0.002 | 17.5 | B | -0.3 | -0.011 | 17.7 | B | -0.1 | 0.000 |
| | PM | 17.5 | B | 18.0 | B | 18.2 | B | 0.2 | 0.008 | 22.1 | C | 23.7 | C | 2.1 | 0.036 | 22.5 | C | 0.6 | 0.013 | 23.0 | C | 1.3 | 0.023 |
| Lawrence Expwy. & US 101 SB Ramps | AM | 10.3 | B | 11.3 | B | 11.3 | B | 0.0 | 0.004 | 13.1 | B | 12.4 | B | -0.4 | 0.008 | 12.5 | B | -0.4 | -0.004 | 12.5 | B | -0.4 | 0.005 |
| | PM | 15.2 | B | 15.8 | B | 15.8 | B | 0.1 | 0.008 | 37.7 | D | 46.3 | D | 12.7 | 0.035 | 40.9 | D | 4.4 | 0.013 | 43.8 | D | 9.0 | 0.025 |
| Lawrence Expwy. & Oakmead Pkwy. | AM | 41.4 | D | 40.6 | D | 42.2 | D | 2.4 | 0.017 | 45.3 | D | 51.4 | D | 7.5 | 0.053 | 46.7 | D | 0.8 | 0.003 | 49.1 | D | 5.6 | 0.042 |
| | PM | 49.1 | D | 49.3 | D | 49.3 | D | 0.6 | 0.005 | 93.0 | F | 67.6 | E | -43.5 | -0.100 | 59.3 | E | -57.1 | -0.134 | 75.6 | E | -29.0 | -0.066 |
| Lawrence Expwy. & Arques Ave. | AM | 38.0 | D | 41.1 | D | 41.0 | D | -0.5 | 0.000 | 41.3 | D | 37.9 | D | -7.1 | -0.057 | 37.6 | D | -7.4 | -0.065 | 39.1 | D | -4.3 | -0.034 |
| | PM | 66.3 | E | 72.0 | E | 71.5 | E | -0.7 | -0.004 | 97.6 | F | 70.1 | E | -44.7 | -0.149 | 67.6 | E | -49.0 | -0.164 | 80.9 | F | -26.7 | -0.094 |
| Lawrence Expwy. & Kifer Rd. | AM | 23.0 | C | 27.3 | C | 27.3 | C | 0.0 | -0.002 | 40.5 | D | 40.3 | D | -0.2 | -0.044 | 40.2 | D | -0.4 | -0.048 | 40.4 | D | 0.1 | -0.028 |
| | PM | 50.4 | D | 56.2 | E | 56.1 | E | -0.1 | -0.001 | 68.9 | E | 65.4 | E | -5.1 | -0.029 | 65.1 | E | -5.7 | -0.033 | 66.2 | E | -3.8 | -0.020 |

Notes:
* Denotes a CMP intersection.
Significant impacts are shown with an outline.

# 1. Introduction

This report presents the results of the traffic impact analysis (TIA) conducted for the proposed conversion of light industrial land uses to residential development on approximately 129 acres of land in Sunnyvale, California. The 129-acre site is generally bordered by Duane Avenue, Stewart Drive, Britton Avenue and Lawrence Expressway (see Figure 1). The proposed General Plan designation would be ITR – Industrial-to-Residential. The ITR combining district was created in 1993 to specifically identify commercial and light industrial areas that would be appropriate for transition to residential uses. The ITR designation on these sites allows for the continuation or expansion of existing light industrial and commercial uses, as well as the construction of new low-medium-, medium-, and high-density residential housing. On the General Plan Amendment (GPA) site, the conversion to residential uses would be implemented with the R-2 (Low-Medium Density Residential, 10 to 12 DU/AC), R-3 (Medium Density Residential, 13 to 24 DU/AC), and R-4 (High Density Residential, 25 to 36 DU/AC) and Retail zoning designations.

Three GPA land use scenarios were analyzed for potentially significant impacts for the year 2020. Year 2020 baseline volumes were developed using the City of Sunnyvale's transportation model. The raw forecast volumes were refined to produce peak hour turning-movement volumes at the study intersections. GPA Scenario 1 – full buildout of the site – involves converting 129.23 acres of light industrial uses to 119.66 acres of residential development (R-3 and R-4 zoning), plus 9.57 acres of commercial development. Scenario 1 would result in 2,842 new dwelling units and 104,220 square feet (s.f.) of retail development. GPA Scenario 2 – reduced density alternative – involves converting 129.23 acres of light industrial uses to 119.66 acres of residential development at a lower overall density (R-2 and R-3 zoning), plus 9.57 acres of commercial development. Scenario 2 would result in 1,395 new dwelling units and 104,220 square feet (s.f.) of retail development. GPA Scenario 3 – smaller site alternative – involves converting 84.11 acres of light industrial uses to 84.11 acres of residential development (R-3 and R-4 zoning), which would result in 2,049 new units.

This report also includes a near-term impact analysis conducted for two proposed residential projects located within the ITR conversion area. One of the two proposed near-term projects, a 250-unit townhouse development, would be constructed on the currently vacant 14-acre AMD site located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection. Access to this project site would be provided via Duane Avenue and DeGuigne Drive. The other proposed near-term

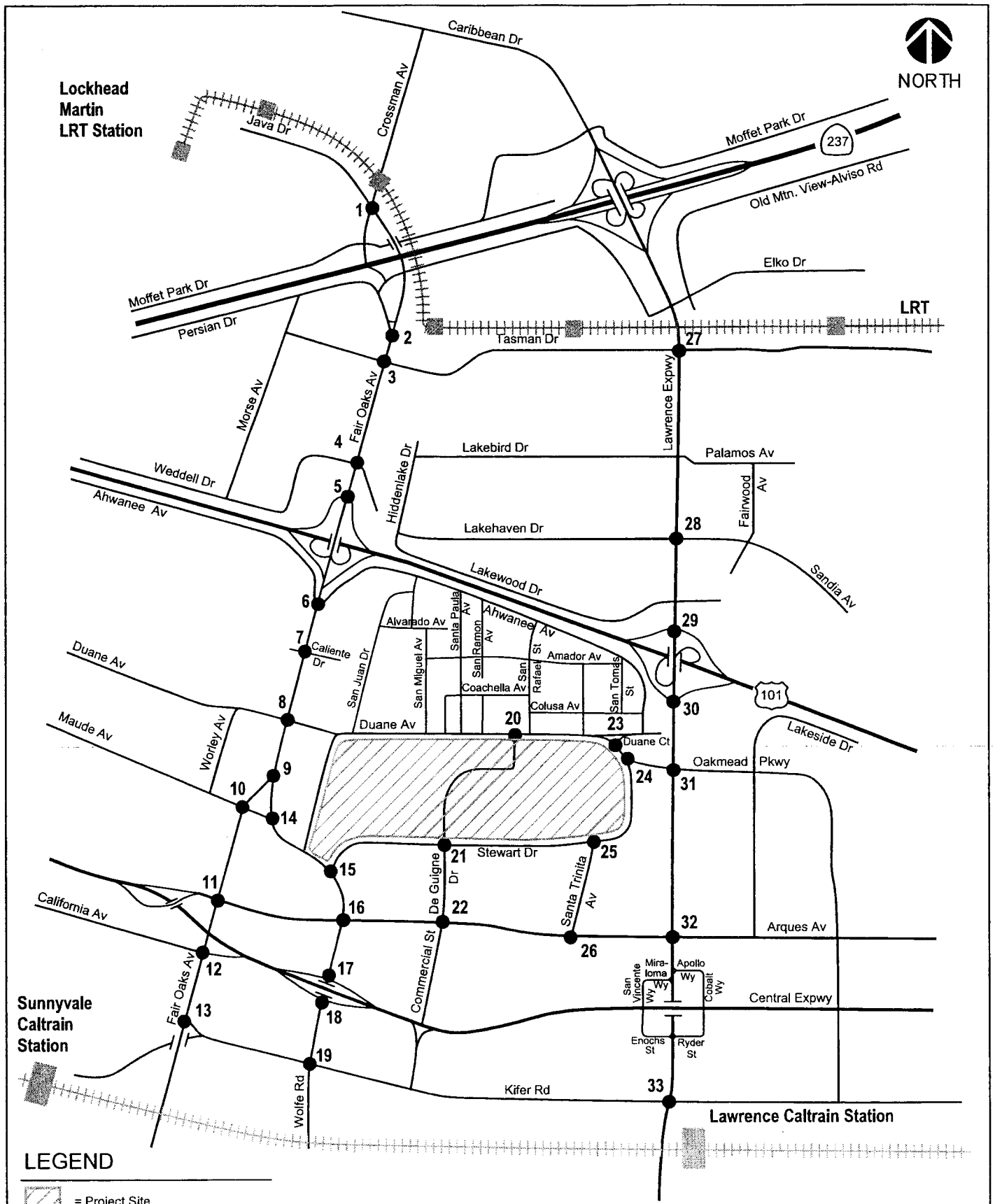


Figure 1

# SITE LOCATION AND STUDY INTERSECTIONS

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East Sunnyvale ITR

project is a Taylor-Woodrow project that would consist of a mix of condominiums and townhouses totaling 304 units. This proposed project would replace approximately 111,300 s.f. of existing light industrial uses on a 7.3-acre site located in the northeast quadrant of the Stewart Drive and Duane Avenue intersection. Access to the Taylor-Woodrow project site would be provided via Duane Avenue and Duane Court.

## Scope of Study

The potential impacts related to the proposed development were evaluated following the standards and methodologies set forth by the City of Sunnyvale and the Santa Clara Valley Transportation Authority (VTA). The VTA administers the County Congestion Management Program (CMP). The traffic study includes an analysis of AM and PM peak hour traffic conditions for 33 intersections. The study intersections are identified below. The CMP intersections are denoted with an asterisk ( * ).

### *Study Intersections*

1. Java Drive and Crossman Avenue
2. Fair Oaks Avenue and Fair Oaks Way
3. Fair Oaks Avenue and Tasman Drive
4. Fair Oaks Avenue and Weddell Drive
5. Fair Oaks Avenue and US 101 NB Ramps
6. Fair Oaks Avenue and Ahwanee Avenue
7. Fair Oaks Avenue and Caliente Drive
8. Fair Oaks Avenue and Duane Avenue
9. Fair Oaks Avenue and Wolfe Road
10. Fair Oaks Avenue and Maude Avenue
11. Fair Oaks Avenue and Arques Avenue
12. Fair Oaks Avenue and California Avenue
13. Fair Oaks Avenue and Kifer Road
14. Wolfe Road and Maude Avenue (unsignalized)
15. Wolfe Road and Stewart Drive
16. Wolfe Road and Arques Avenue
17. Wolfe Road and Central Expressway (North)
18. Wolfe Road and Central Expressway (South)
19. Wolfe Road and Kifer Road
20. DeGuigne Drive and Duane Avenue
21. DeGuigne Drive and Stewart Drive (unsignalized)
22. Commercial Street and Arques Avenue
23. Duane Avenue and Duane Court (unsignalized)
24. Stewart Drive and Duane Avenue
25. Santa Trinita Avenue and Stewart Drive
26. Santa Trinita Avenue and Arques Avenue
27. Lawrence Expressway and Tasman Drive *
28. Lawrence Expressway and Lakehaven Drive
29. Lawrence Expressway and US 101 NB Ramps
30. Lawrence Expressway and US 101 SB Ramps
31. Lawrence Expressway and Oakmead Parkway
32. Lawrence Expressway and Arques Avenue *
33. Lawrence Expressway and Kifer Road

Traffic conditions at the intersections were analyzed for the weekday AM and PM peak hours of traffic. The AM peak hour of traffic is generally between 7:00 and 9:00 AM, and the PM peak hour is typically between 4:00 and 6:00 PM. It is during these periods that the most congested traffic conditions occur on an average weekday.

Traffic conditions were evaluated for the following scenarios:

**Scenario 1:** *Existing Conditions.* Existing intersection traffic volumes were obtained from the City of Sunnyvale and supplemented with new 2006 manual turning-movement counts. New traffic count data are contained in Appendix A.

**Scenario 2:** *Background Conditions.* Background traffic volumes were estimated by adding to existing peak hour volumes the projected volumes from approved but not yet completed developments in the project area. The added traffic from approved but not yet completed developments was estimated based on information provided by the Cities of Sunnyvale and Santa Clara relating to approved projects within their jurisdictions. The background traffic data are included in Appendix B.

**Scenario 3:** *Near-Term Project Conditions.* Projected peak hour traffic volumes with the two proposed near-term residential projects were estimated by adding to background traffic volumes the additional traffic generated by the two projects located within the ITR conversion area. One of the projects, the Taylor-Woodrow 304-unit residential development, would replace 111,300 s.f. of light industrial uses currently on the site. Therefore, the trips generated by the existing light industrial uses were first subtracted from background traffic volumes at each study intersection before adding the traffic generated by the project. Near-term project conditions were evaluated relative to background conditions in order to determine potential near-term project impacts.

**Scenario 4**: *Future 2020 Baseline Conditions.* Future 2020 traffic volumes were obtained from the City of Sunnyvale transportation model. The raw forecast volumes were refined to produce peak hour turning-movement volumes at the study intersections.

**Scenario 5**: *Long-Range GPA Conditions.* The proposed GPA to convert approximately 129 acres of light industrial uses to residential uses (ITR) was analyzed for potentially significant traffic impacts. Full buildout of the GPA site – GPA Scenario 1 – involves converting 129.23 acres of light industrial uses to 119.66 acres of residential development (R-3 and R-4 zoning), plus 9.57 acres of commercial development. Two alternative GPA land use scenarios – the reduced density Scenario 2 and the reduced size Scenario 3 – also were analyzed. The GPA conditions were evaluated relative to future 2020 buildout conditions in order to determine potential long-range impacts due to the each of the GPA scenarios.

## Methodology

This section describes the methods used to determine the traffic conditions for each scenario described above. It includes descriptions of the data requirements, the analysis methodologies, and the applicable level of service standards.

## *Data Requirements*

The data required for the analysis were obtained from field observations, new traffic counts, previous traffic studies, the City of Sunnyvale, the City of Santa Clara, the Institute of Transportation Engineers (ITE) manual entitled *Trip Generation, seventh edition* (2003), and the CMP Monitoring Report. The following data were collected from these sources:

- existing intersection volumes
- existing lane geometrics
- signal timing and phasing (for signalized intersections only)
- a list of approved but not yet completed projects
- applicable trip generation rates

## *Analysis Methodologies and Level of Service Standards*

Traffic conditions at the study intersections were evaluated using level of service (LOS). *Level of Service* is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The various analysis methods are described below.

### Signalized Intersections

The signalized study intersections are subject to the City of Sunnyvale level of service standards. The City of Sunnyvale level of service methodology is TRAFFIX, which is based on the Highway Capacity Manual (HCM) 2000 method for signalized intersections. TRAFFIX evaluates signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. Since TRAFFIX also is the CMP-designated intersection level of service methodology, the City of Sunnyvale methodology employs the CMP default values for the analysis parameters. The City of Sunnyvale General Plan level of service standard for signalized intersections is LOS D or better, except that intersections considered "regionally significant" have a standard of LOS E. In the study area, all "regionally significant" signalized intersections are located on Lawrence Expressway. The correlation between delay and level of service is shown in Table 1.

### Unsignalized Intersections

Three of the study intersections presently are unsignalized. The need for signalization of unsignalized intersections is assessed based on the Peak Hour Volume Warrant (Warrant 3) described in the *Manual on Uniform Traffic Control Devices for Streets and Highways*, Part 4, Highway Traffic Signals, 2003. This method provides an indication whether vehicular peak hour volumes are, or would be, sufficient to justify installation of a traffic signal. Signal warrants were checked for each unsignalized study intersection.

**Table 1**
**Signalized Intersection Level of Service Based on Average Delay**

| Level of Service | Description | Average Control Delay Per Vehicle (Sec.) |
|---|---|---|
| A | Operations with very low delay occurring with favorable progression and/or short cycle lengths. | Less than 10.0 |
| B | Operations with low delay occurring with good progression and/or short cycle lengths. | 10.1 to 20.0 |
| C | Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear. | 20.1 to 35.0 |
| D | Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable. | 35.1 to 55.0 |
| E | Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay. | 55.1 to 80.0 |
| F | Operation with delays unacceptable to most drivers occurring due to oversaturation, poor progression, or very long cycle lengths. | Greater than 80.0 |

Source: Transportation Research Board, Highway Capacity Manual (2000), Washington, D.C.

## Freeway Segment Evaluation

The need to study freeway segments for the potential near-term project and GPA scenarios was evaluated. According to CMP guidelines, a detailed freeway segment analysis should be conducted when a proposed development would add traffic to a freeway segment operating at LOS F equal to one percent of the segments capacity or greater. The results of the freeway evaluation show that the near-term project scenario would not cause a significant increase in traffic volume (one percent or more of capacity) on any of the freeway segments' in the study area. The GPA Scenario 1 would cause an increase of more than one percent on the segment of US 101 between Great America Parkway and Lawrence Expressway. However, this would not be considered a significant increase since this segment of US 101 currently is operating at LOS D during both the AM and PM peak hours. Neither GPA Scenario 2 nor GPA Scenario 3 would result in significant increases in traffic volume on any study freeway segment. Therefore, based on the results of the freeway segment capacity evaluation, a more detailed analysis of freeway segments is not required. Table 2 summarizes the results of the freeway capacity evaluation for the near-term project and GPA project scenarios.

## Table 2
## Freeway Segment Capacity Evaluation

| Freeway | Segment | Direction | # of Mixed-Flow Lanes | # of HOV Lanes | Capacity (vphpl) /a/ | 1% of Capacity | Peak Hour | Existing LOS | Near-Term Project Project Trips | Near-Term Project % Capacity | Long-Range Scenario 1 Project Trips | Long-Range Scenario 1 % Capacity | Long-Range Scenario 2 Project Trips | Long-Range Scenario 2 % Capacity | Long-Range Scenario 3 Project Trips | Long-Range Scenario 3 % Capacity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| US 101 | Great America Pkwy to Lawrence Expwy | NB | 3 | 1 | 8700 | 87 | AM | D | -11 | /b/ | -268 | /b/ | -283 | /b/ | -176 | /b/ |
| | | | | | | | PM | D | 24 | 0.3% | 106 | 1.2% | 35 | 0.4% | 69 | 0.8% |
| | | SB | 3 | 1 | 8700 | 87 | AM | D | 25 | 0.3% | 87 | 1.0% | 13 | 0.1% | 64 | 0.7% |
| | | | | | | | PM | F | -2 | /b/ | -189 | /b/ | -223 | /b/ | -128 | /b/ |
| US 101 | Lawrence Expwy to Fair Oaks Av | NB | 3 | 1 | 8700 | 87 | AM | D | 7 | /b/ | 20 | 0.2% | 7 | /b/ | 20 | 0.2% |
| | | | | | | | PM | D | 1 | /b/ | -8 | /b/ | -14 | /b/ | -8 | /b/ |
| | | SB | 3 | 1 | 8700 | 87 | AM | D | -1 | /b/ | -17 | /b/ | -20 | /b/ | -17 | /b/ |
| | | | | | | | PM | D | 6 | /b/ | 21 | 0.2% | 8 | /b/ | 21 | 0.2% |
| US 101 | Fair Oaks Av to Mathilda Av | NB | 3 | 1 | 8700 | 87 | AM | D | 17 | 0.2% | 75 | 0.9% | 27 | 0.3% | 54 | 0.6% |
| | | | | | | | PM | D | 4 | /b/ | -37 | /b/ | -59 | /b/ | -27 | /b/ |
| | | SB | 3 | 1 | 8700 | 87 | AM | D | -2 | /b/ | -79 | /b/ | -88 | /b/ | -52 | /b/ |
| | | | | | | | PM | D | 16 | 0.2% | 82 | 0.9% | 37 | 0.4% | 54 | 0.6% |
| SR 237 | Great America Pkwy to Lawrence Expwy | EB | 2 | 1 | 6200 | 62 | AM | F | 7 | 0.1% | 22 | 0.4% | 1 | /b/ | 16 | 0.3% |
| | | | | | | | PM | D | -1 | /b/ | -65 | /b/ | -75 | /b/ | -45 | /b/ |
| | | WB | 2 | 1 | 6200 | 62 | AM | D | -4 | /b/ | -90 | /b/ | -95 | /b/ | -60 | /b/ |
| | | | | | | | PM | D | 7 | 0.1% | 29 | 0.5% | 9 | 0.1% | 19 | 0.3% |
| SR 237 | Lawrence Expwy to Fair Oaks Av | EB | 2 | 1 | 6200 | 62 | AM | F | 0 | /b/ | 1 | /b/ | 0 | /b/ | 1 | /b/ |
| | | | | | | | PM | D | 1 | /b/ | 3 | /b/ | 1 | /b/ | 3 | /b/ |
| | | WB | 2 | 1 | 6200 | 62 | AM | D | 1 | /b/ | 3 | /b/ | 1 | /b/ | 3 | /b/ |
| | | | | | | | PM | D | 0 | /b/ | 1 | /b/ | 1 | /b/ | 1 | /b/ |
| SR 237 | Fair Oaks Av to Mathilida Av | EB | 2 | 1 | 6200 | 62 | AM | F | 0 | /b/ | 2 | /b/ | 1 | /b/ | 2 | /b/ |
| | | | | | | | PM | D | 2 | /b/ | 10 | 0.2% | 5 | /b/ | 7 | 0.1% |
| | | WB | 2 | 1 | 6200 | 62 | AM | C | 2 | /b/ | 10 | 0.2% | 5 | /b/ | 8 | 0.1% |
| | | | | | | | PM | D | 1 | /b/ | 5 | /b/ | 2 | /b/ | 4 | /b/ |

Notes:
/a/ The capacity of mixed-flow lanes is 2,300 vphpl. The capacity of HOV lanes is 1,800 vphpl.
/b/ Project trips added are either negative or negligible.

Source: Santa Clara Valley Transportation Authority Congestion Management Program Monitoring Study, 2004.

## Report Organization

The remainder of this report is divided into six chapters. Chapter 2 describes existing conditions in terms of the existing roadway network and other transportation facilities. Chapter 3 presents the intersection operations under background conditions. Chapter 4 describes the method used to estimate the near-term projects and their impact on the transportation system. Chapter 5 discusses the long-range GPA traffic conditions that would result with the conversion of light industrial to residential (ITR) land uses. Chapter 6 describes non-level of service issues associated with the proposed near-term projects and the proposed GPA land use changes.

# 2.
# Existing Conditions

This chapter describes the existing conditions for all of the major transportation facilities in the vicinity of the site, including the roadway network, transit service, and bicycle and pedestrian facilities.

## Existing Roadway Network

Regional access to the project study area is provided by US 101 and SR 237. These facilities are described below.

*US 101* is an eight-lane freeway (three mixed-flow lanes and one HOV lane in each direction) in the vicinity of the site. US 101 extends northward through San Francisco and southward through Gilroy. Access to and from the project study area is provided via interchanges at Lawrence Expressway, Fair Oaks Avenue and Mathilda Avenue.

*SR 237* is a four to six-lane freeway in the vicinity of the project site that extends west to El Camino Real (Route 82) and east to I-880 in Milpitas. East of Mathilda Avenue, SR 237 has two mixed-flow lanes and one HOV lane in each direction. West of Mathilda Avenue, SR 237 has two mixed-flow lanes in each direction. SR 237 provides access to the project study area via interchanges at Lawrence Expressway, Fair Oaks Avenue and Mathilda Avenue.

Major roadways within the project area include Lawrence Expressway, Fair Oaks Avenue, Wolfe Road, Tasman Drive, Arques Avenue, Central Expressway and Kifer Road. These roads are described below.

*Lawrence Expressway* is an eight-lane north-south expressway with carpool lanes within the study area. Lawrence Expressway begins at its junction with SR 237 and extends southward into Saratoga, where it transitions into Quito Road at Saratoga Avenue. Full interchanges are located at US 101 and SR 237. Lawrence Expressway provides access to the project site via Duane Avenue.

*Fair Oaks Avenue* is generally a six-lane north-south arterial with two northbound lanes, three southbound lanes, and a two-way center left-turn lane in the study area. North of US 101, Fair Oaks Avenue has a raised center median. Fair Oaks Avenue begins at Java Drive north of SR 237. Fair Oaks

Avenue extends southward and transitions into Remington Drive at its junction with El Camino Real. Fair Oaks Avenue provides access to the project site via its intersection with Duane Avenue. Freeway interchanges are located at US 101 and SR 237.

*Wolfe Road* is a north-south arterial that extends from Fair Oaks Avenue in the north to its interchange with I-280 in Cupertino. South of I-280, Wolfe Road transitions into Miller Avenue. Wolfe Road is a six-lane roadway with a raised center median north of Reed Avenue, and is a four-lane undivided roadway south of Reed Avenue. Wolfe Road provides access to the project site via Stewart Drive.

*Tasman Drive* is an east-west arterial that extends from Morse Avenue eastward to I-880, where it transitions into Great Mall Parkway in Milpitas. West of Fair Oaks Avenue, Tasman Drive is a two-lane commercial collector street. East of Fair Oaks Avenue, Tasman Drive is a four-lane arterial. The LRT line runs down the middle of Tasman Drive between North First Street and Fair Oaks Avenue.

*Arques Avenue* is a four-lane east-west roadway with a two-way center left-turn lane within the study area. Arques Avenue begins at its intersection with Central Expressway and extends eastward to become Scott Boulevard east of Oakmead Parkway. Scott Boulevard makes a gradual curve south and extends into Santa Clara.

*Central Expressway* begins in Mountain View as Alma Street, and extends eastward into Santa Clara, where it terminates at De La Cruz Boulevard. Central Expressway is primarily a four-lane east-west oriented expressway within the study area, although it has six lanes between SR 85 and SR 237. East of Bowers Avenue, Central Expressway has four to six lanes. Central Expressway intersects Lawrence Expressway, Fair Oaks Avenue and Wolfe Road near the project site.

*Kifer Road* is a four-lane east-west roadway with a two-way center left-turn lane within the study area. Kifer Road begins at its intersection with Fair Oaks Avenue and extends eastward to become Walsh Avenue east of Bowers Avenue. Walsh Avenue extends into Santa Clara and terminates just east of Lafayette Street.

Other roadways in the immediate vicinity of the project site include Duane Avenue, Stewart Drive, DeGuigne Drive and Santa Trinita Avenue. These facilities are described below.

*Duane Avenue* runs east to west and serves as the northern boundary of the project site. Duane Avenue is generally a four-lane undivided roadway between Fair Oaks Avenue and Duane Court. West of Fair Oaks Avenue, Duane Avenue is a two-lane street providing access to the surrounding residential neighborhoods. East of Lawrence Expressway, Duane Avenue becomes Oakmead Parkway. Duane Avenue provides direct access to the project site.

*Stewart Drive* runs east to west and serves as the southern boundary of the project site. Stewart Drive is a two-lane roadway with a two-way center left-turn lane. Stewart Drive begins at Wolfe Road and extends eastward, makes a curve north and terminates at its intersection with Duane Avenue. Stewart Drive provides direct access to the project site.

*DeGuigne Drive* is generally a north-south street that runs through the middle of the project site. DeGuigne Drive is a two-lane road with a two-way center left-turn lane between Duane Avenue and Arques Avenue. South of Arques Avenue DeGuigne Drive transitions into Commercial Street. Commercial Street is a two-lane roadway that terminates at Central Expressway.

*Santa Trinita Avenue* is a short two-lane street with a two-way center left-turn lane. Santa Trinita Avenue connects Stewart Drive with Arques Avenue and serves the surrounding light industrial uses.

## Existing Bicycle and Pedestrian Facilities

According to the City of Sunnyvale Bicycle Map and the Santa Clara Valley Transportation Agency (VTA) Bikeways Map, there are numerous bike lanes and City-signed bike routes in the vicinity of the project site. The following roadways contain bike lanes:

- Stewart Drive, between Wolfe Road and Duane Avenue
- DeGuigne Drive/Commercial Street, between Duane Avenue and Central Expressway
- Santa Trinita Avenue, between Stewart Drive and Arques Avenue
- Arques Avenue, east of Fair Oaks Avenue
- Fair Oaks Avenue, between Kifer Road and Evelyn Avenue
- Wolfe Road, between Fair Oaks Avenue and Reed Avenue
- Oakmead Parkway, between Lawrence Expressway and Central Expressway
- Nearly the entire length of Lakeside Drive within the Sunnyvale city limit
- Kifer Road, between Fair Oaks Avenue and Lawrence Expressway
- Weddell Drive, serving to connect the John W Christian Greenbelt multi-use off-street paths adjacent to Weddell Drive and Lakehaven Drive
- Morse Avenue, between the John W Christian Greenbelt multi-use off-street path and Persian Drive
- Persian Drive, between Mathilda Avenue and Lawrence Expressway
- Elko Drive, east of Lawrence Expressway
- Tasman Drive, between Morse Avenue and Fair Oaks Avenue
- Moffett Park Drive, between Bordeaux Drive and Sunnyvale Baylands Park
- Crossman Avenue, Between Java Drive and Caribbean Drive
- Caribbean Drive, between US 101 and Mathilda Avenue

Additionally, Fair Oaks Avenue is a signed City bike route between Tasman Drive and Weddell Drive, and a short multi-use off-street path serves as a connection between Britton Avenue and Stewart Drive near the site. Figure 2 shows the existing bicycle facilities in the study area.

Pedestrian facilities in the project area consist of sidewalks along the majority of local roadways, as well as within the surrounding residential neighborhoods. There are no sidewalks, however, along the perimeter of the Taylor Woodrow site. Small segments of Stewart Drive and DeGuigne Drive also are void of sidewalks.

## Existing Transit Service

Existing transit service to the study area is provided by the Santa Clara Valley Transportation Authority (VTA) and Caltrain. These are described below.

### *Bus Service*

The study area is served by several local and express VTA bus lines (shown on Figure 3). Seven bus lines provide service to and from the Lockheed Martin Transit Center, located approximately 2 miles northwest of the project site. Six bus lines provide service to and from the Sunnyvale Transit Center, located approximately 1 ½ miles southwest of the project site. Bus stops located within close proximity (walking distance) of the project site are shown on Figure 3.

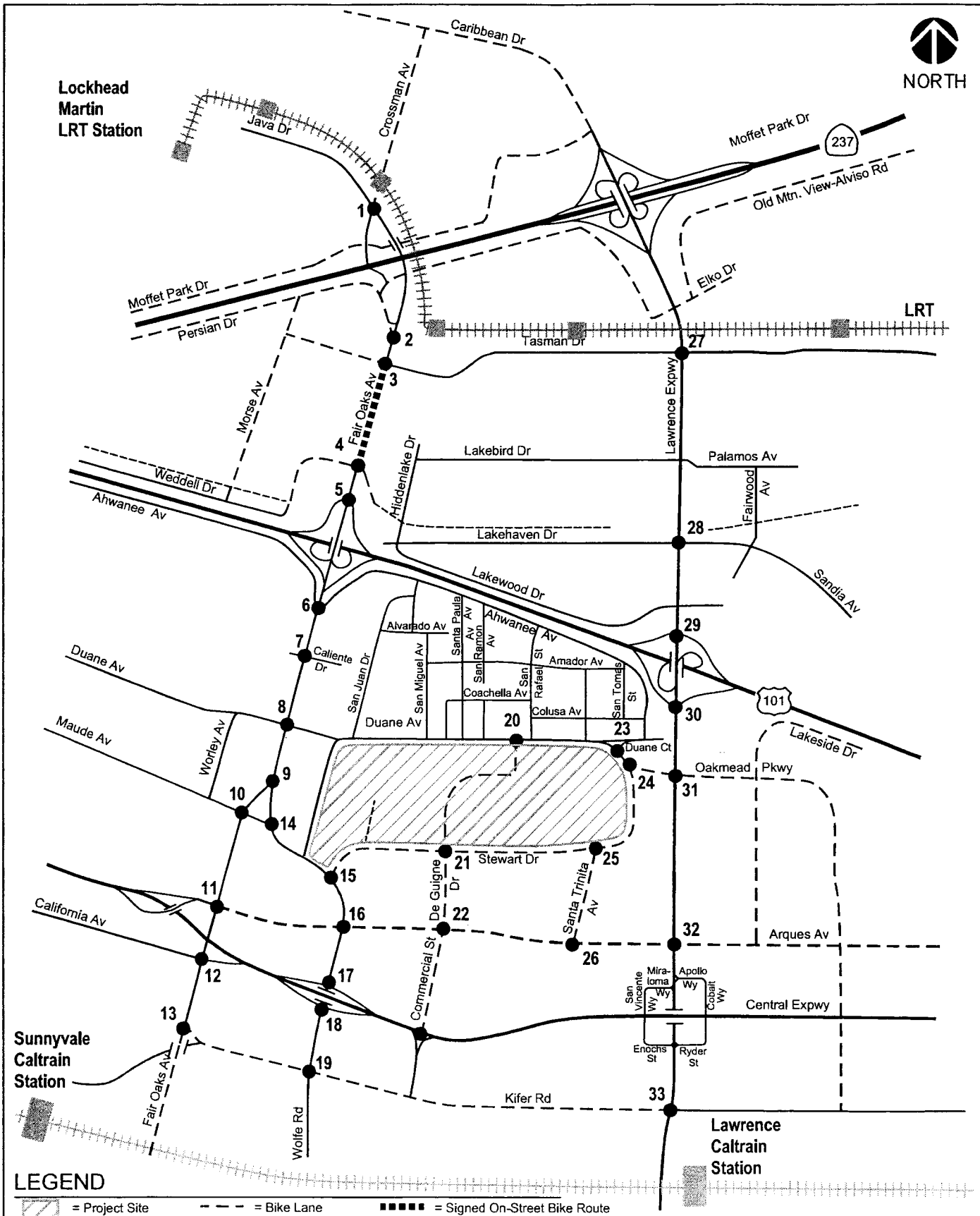


Figure 2

# EXISTING BICYCLE FACILITIES

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Hexagon
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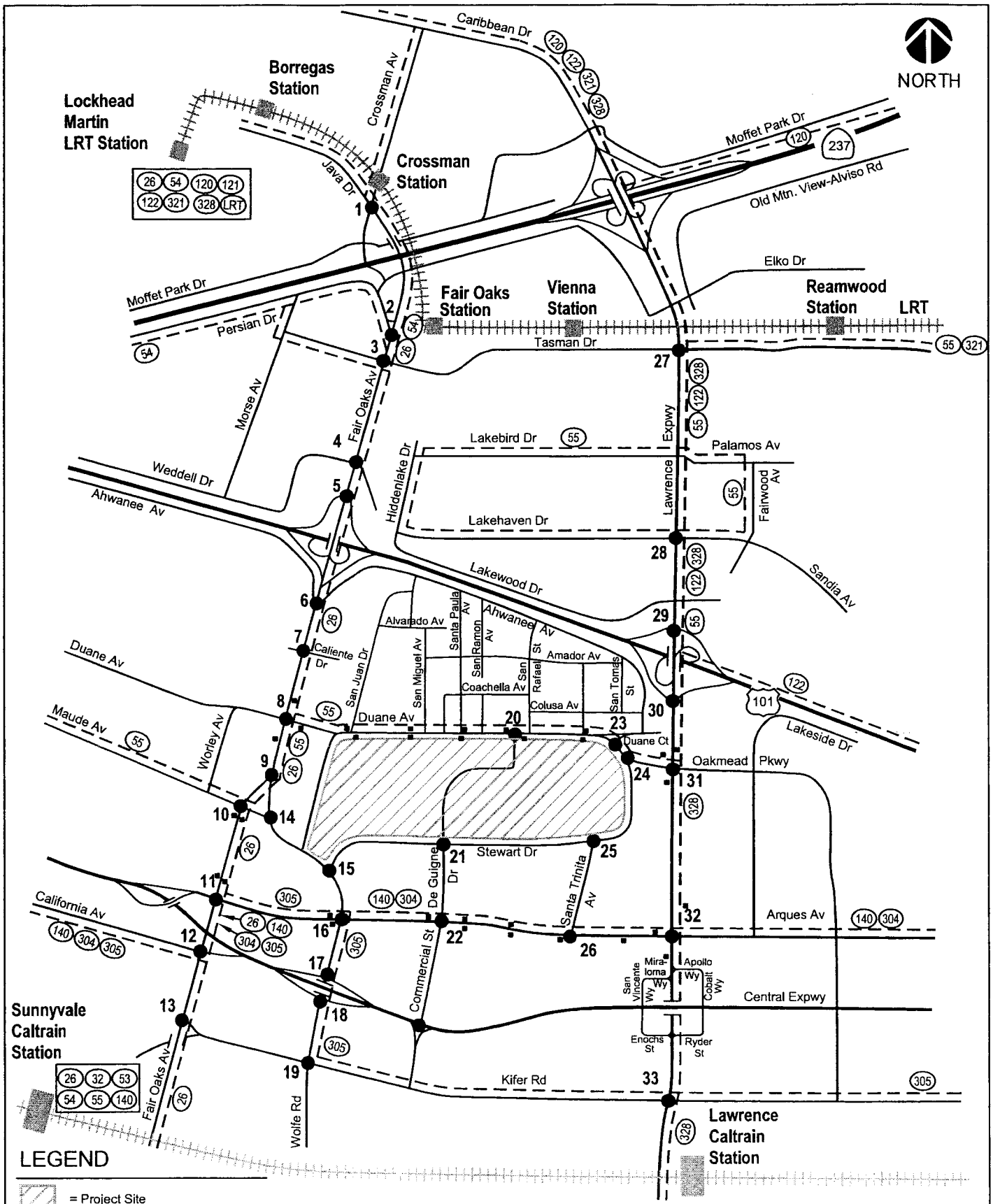


Figure 3

# EXISTING TRANSIT SERVICE

East Sunnyvale ITR

*Route 26* provides service between the Eastridge Transit Center and the Lockheed Martin Transit Center. Route 26 operates along Fair Oaks Avenue, with 20- to 30-minute headways during commute hours.

*Route 54* provides service to West Valley College, the Sunnyvale Transit Center and the Lockheed Martin Transit Center. Within the study area, Route 54 operates along short segments of Mathilda Avenue, Java Drive, Crossman Avenue, Tasman Drive and Morse Avenue, with 30-minute headways during commute hours.

*Route 55* provides service between the Great America/Old Ironsides LRT Station and De Anza College. Within the study area, Route 55 operates along Maude Avenue, Fair Oaks Avenue, Duane Avenue, Lawrence Expressway and Tasman Drive, with 20-minute headways during commute hours. This route provides direct access to the project site via stops along Duane Avenue.

*Limited Stop Routes 304* and *305* provide service between the Santa Teresa LRT station and Mountain View. Within the study area, Routes 304 and 305 operate south and west of the project site, with stops along Arques Avenue, Kifer Road, Fair Oaks Avenue, Wolfe Road, California Avenue and Mathilda Avenue, with 30- to 60-minute headways during commute hours.

*Limited Stop Route 321* provides service between the Great Mall Transit Center and the Lockheed Martin Transit Center. Within the study area, Route 321 operates along Tasman Drive and segments of Caribbean Drive, Crossman Drive and Java Drive, with 30- to 60-minute headways during commute hours.

*Limited Stop Route 328* provides service between the South San Jose-Almaden area and the Lockheed Martin Transit Center. Within the study area, Route 328 operates along Lawrence Expressway and segments of Caribbean Drive, Crossman Drive and Java. Route 328 includes only one bus that operates during the AM and PM commute hours only.

*Express Routes 120, 121 and 122* all provide direct service to the Lockheed Martin Transit Center, located approximately 2 miles northwest of the project site. From the Lockheed Martin Transit Center, Express Routes 120, 121 and 122 provide express service to the Fremont BART Station, the Gilroy Transit Center and the Santa Teresa LRT station, respectively.

*Express Route 140* provides service between the Fremont BART Station and the Sunnyvale Transit Center. The Sunnyvale Transit Center is located approximately 1 ½ miles southwest of the project site.

### *Light Rail Transit (LRT) Service*

The VTA currently operates the 30.5-mile VTA light rail transit (LRT) line system extending from south San Jose through downtown to the northern areas of San Jose, Santa Clara, Mountain View and Sunnyvale. Service operates 24-hours, every 15 minutes during much of the day, and carries over 22,485 riders on an average weekday. The closest LRT stations to the project site are the Fair Oaks, Vienna and Reamwood LRT stations, located approximately 1 ½ miles north of the project site. Bus Routes 26 and 54 connect at the Fair Oaks station. There are no connecting bus routes at the Vienna station. The Reamwood station is served by Routes 55 and 321.

### *Caltrain*

Commuter rail service between San Francisco and Gilroy is provided by Caltrain. The Lawrence Caltrain station is located approximately 1 ½ miles south of the project site near the Lawrence Expressway and Kifer Road intersection, with vehicle access provided via Kifer Road. The Sunnyvale Caltrain station is

located approximately 1 ½ miles southwest of the project site on Evelyn Avenue between Mathilda Avenue and Sunnyvale Avenue. Both Caltrain stations provide Park-and-Ride lots and bike lockers. Caltrain provides 7-day service to both of these stations.

## Existing Lane Configurations and Traffic Volumes

The existing lane configurations at the study intersections were collected in the field and previous traffic impact analyses in the study area. The existing intersection lane configurations are shown on Figure 4. Existing traffic volumes were obtained from the City of Sunnyvale and supplemented with new manual peak hour turning-movement counts. The existing peak hour intersection volumes are shown on Figure 5.

## Existing Intersection Levels of Service

The results of the intersection level of service analysis under existing conditions are summarized in Table 3. The results show that, measured against City of Sunnyvale and CMP standards, all of the signalized study intersections currently operate at acceptable levels of service during both the AM and PM peak hours of traffic. The level of service calculation sheets are included in Appendix C.

### *Signal Warrant Analysis*

Peak hour signal warrant checks (*MUTCD 2003 Edition*, Part 4, Warrant 3) were performed for the unsignalized study intersections to determine whether signalization would be justified on the basis of existing peak hour volumes. The analysis revealed that the unsignalized intersection of Wolfe Road and Maude Avenue currently warrants signalization based on existing PM peak hour volumes. The other two unsignalized intersections do not warrant signalization. The signal warrant sheets are included in Appendix D.

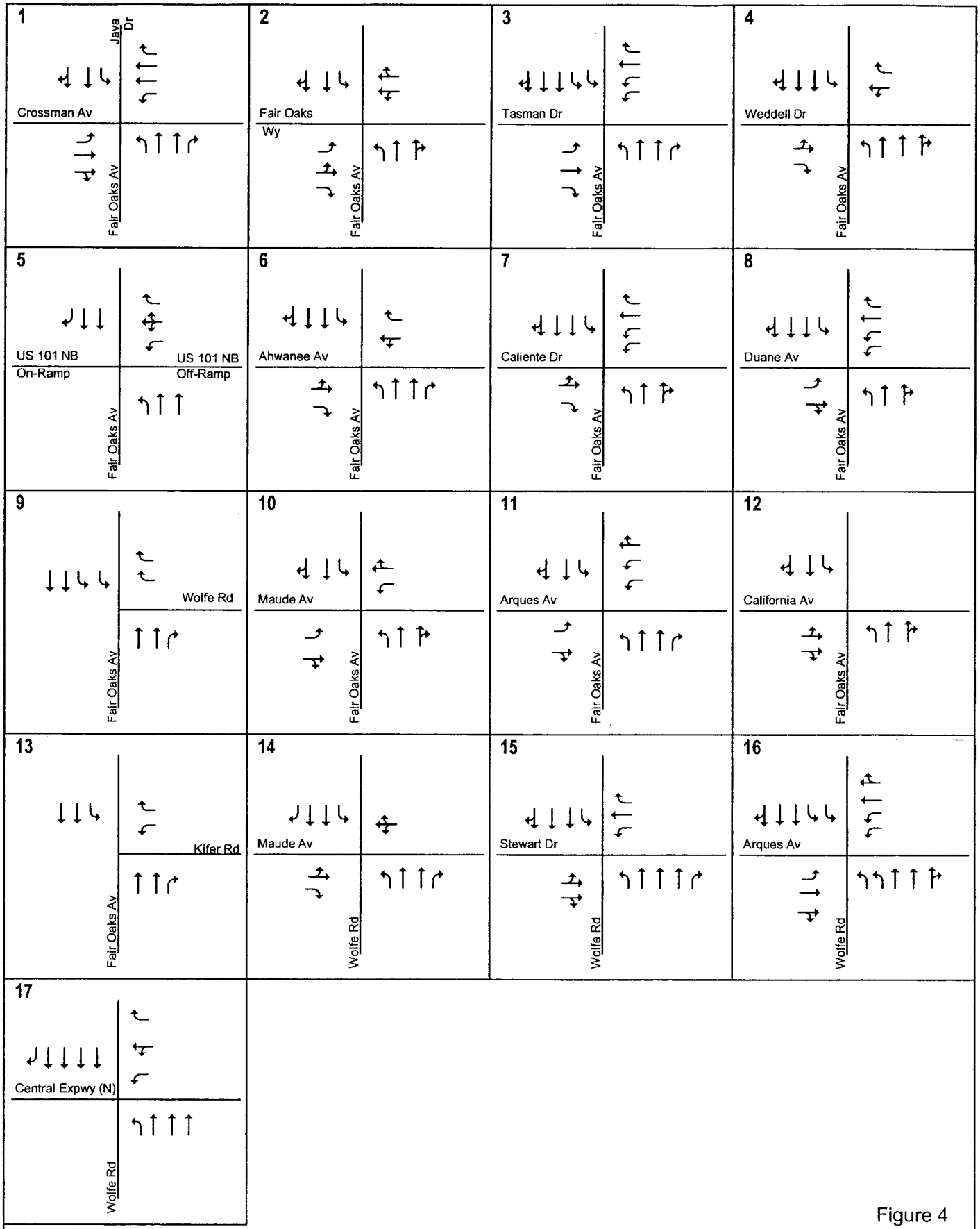


Figure 4

# EXISTING LANE CONFIGURATIONS

East Sunnyvale ITR

Hexagon
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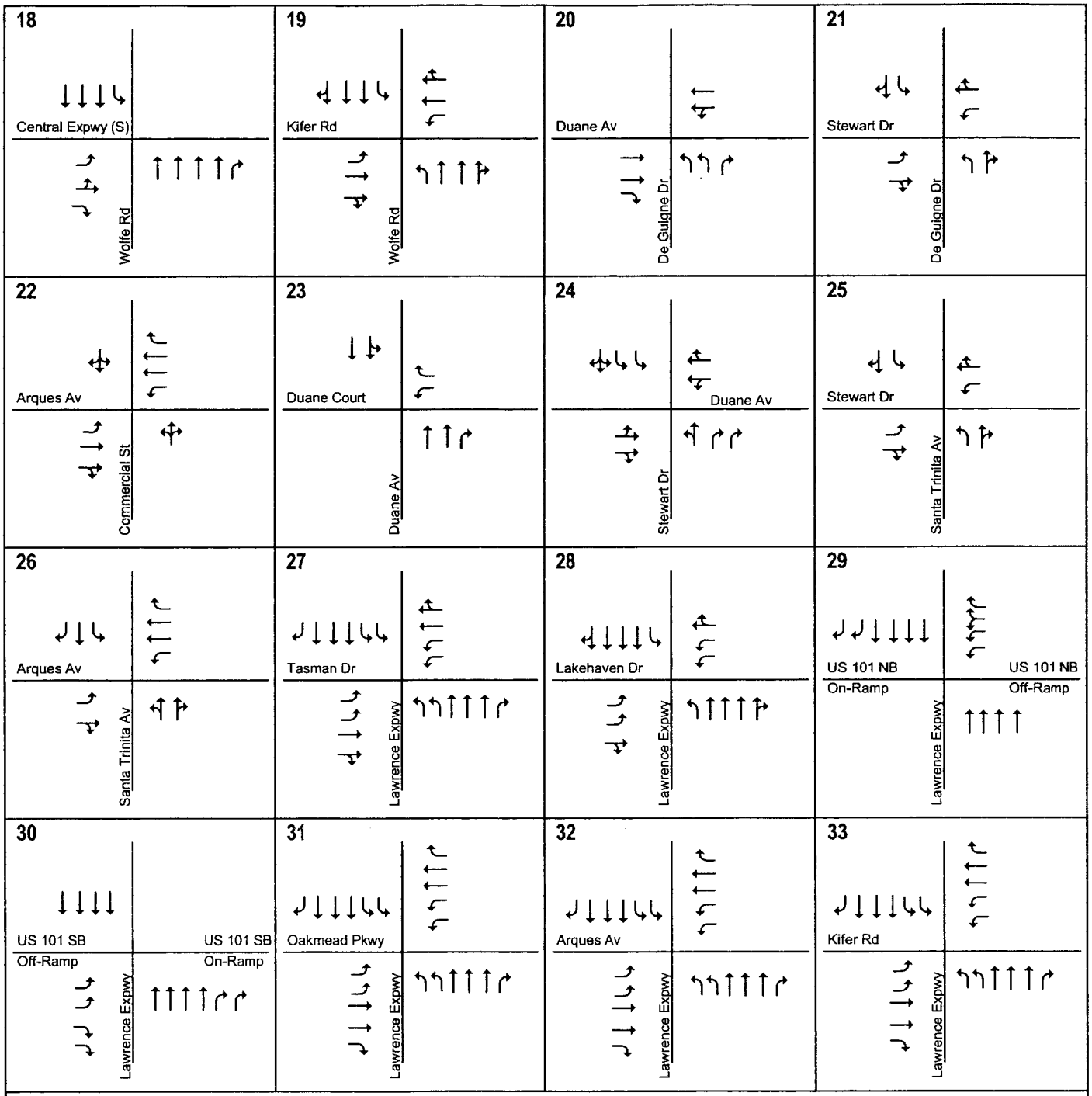



Figure 4

# EXISTING LANE CONFIGURATIONS

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

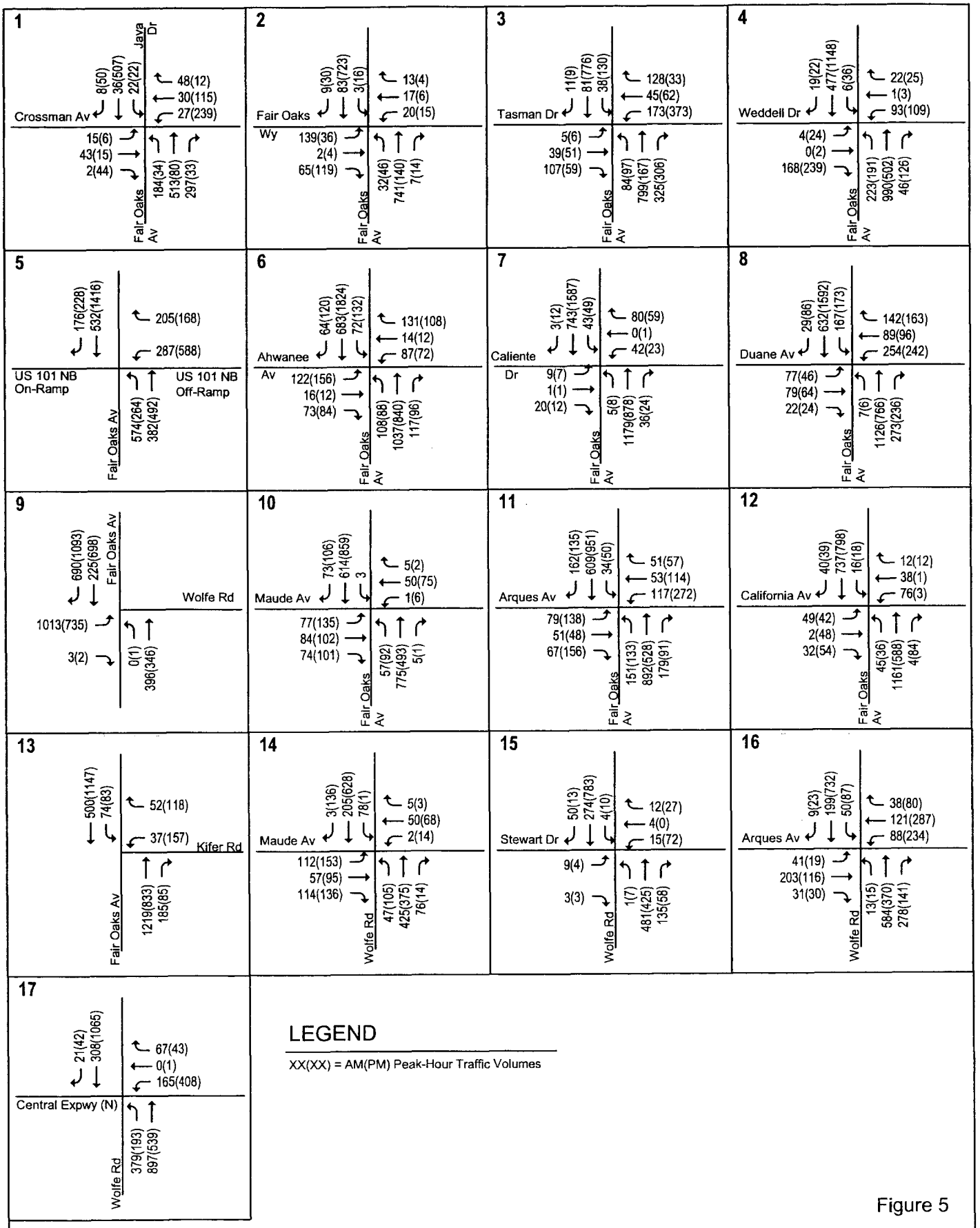
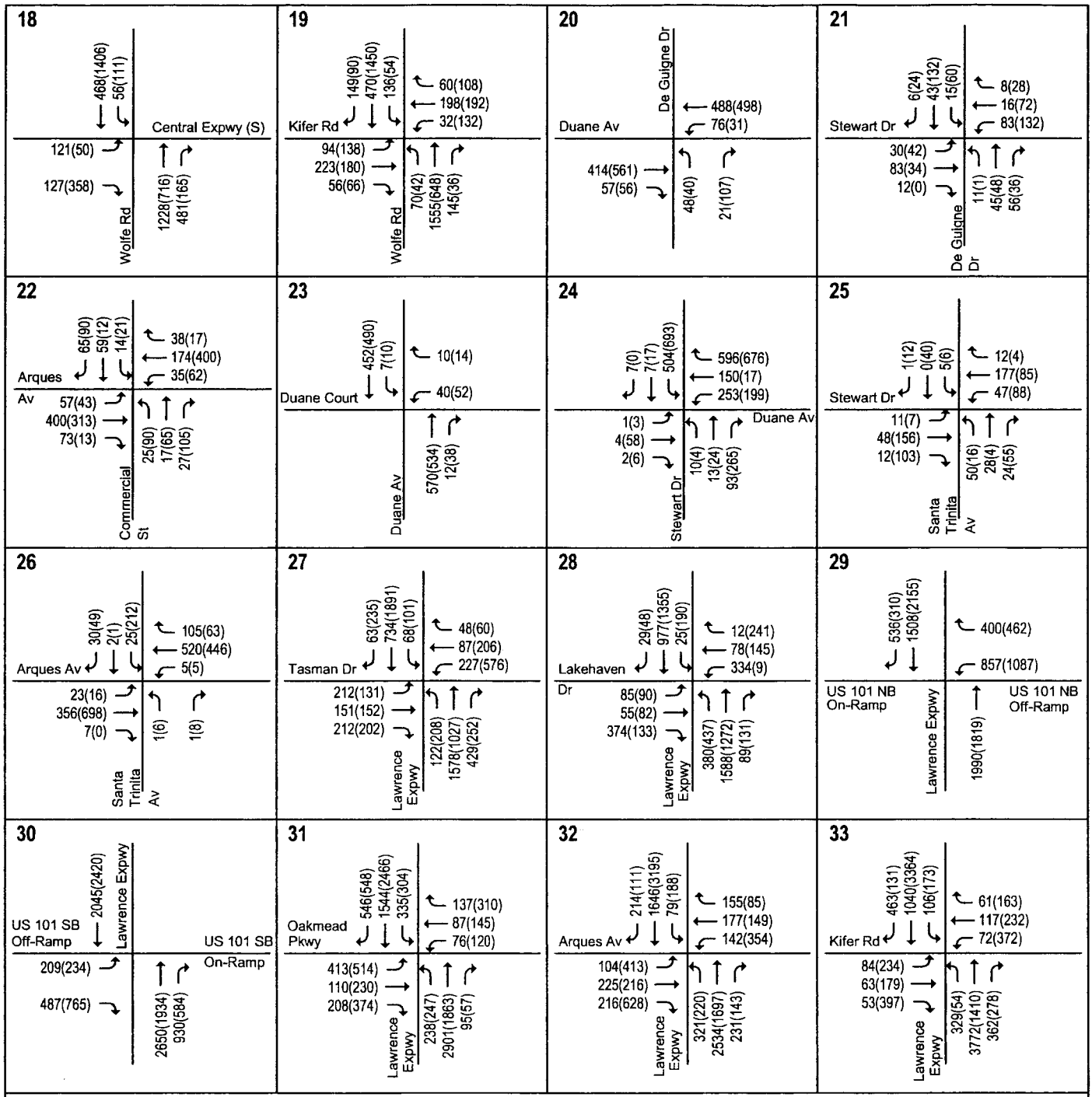



Figure 5

# EXISTING TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.




## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 5

# EXISTING TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

## Table 3
## Existing Intersection Levels of Service

| Intersection | Peak Hour | Count Date | Ave. Delay | LOS |
|---|---|---|---|---|
| Java Dr. & Crossman Ave. | AM | 1/18/2006 | 18.2 | B |
| | PM | 1/18/2006 | 27.0 | C |
| Fair Oaks Ave. & Fair Oaks Way | AM | 2004 | 18.7 | B |
| | PM | 2004 | 20.1 | C |
| Fair Oaks Ave. & Tasman Dr. | AM | 1/18/2006 | 19.4 | B |
| | PM | 1/18/2006 | 26.3 | C |
| Fair Oaks Ave. & Weddell Dr. | AM | 4/6/2005 | 13.3 | B |
| | PM | 4/6/2005 | 22.1 | C |
| Fair Oaks Ave. & US 101 NB Ramps | AM | 10/12/2004 | 22.5 | C |
| | PM | 10/12/2004 | 26.0 | C |
| Fair Oaks Ave. & Ahwanee Ave. | AM | 2004 | 16.8 | B |
| | PM | 2004 | 15.4 | B |
| Fair Oaks Ave. & Caliente Dr. | AM | 1/18/2006 | 11.4 | B |
| | PM | 1/18/2006 | 7.9 | A |
| Fair Oaks Ave. & Duane Ave. | AM | 2004 | 28.5 | C |
| | PM | 2004 | 23.9 | C |
| Fair Oaks Ave. & Wolfe Rd. | AM | 2004 | 20.7 | C |
| | PM | 2004 | 17.9 | B |
| Fair Oaks Ave. & Maude Ave. | AM | 1/18/2006 | 24.0 | C |
| | PM | 1/18/2006 | 22.7 | C |
| Fair Oaks Ave. & Arques Ave. | AM | 2004 | 22.6 | C |
| | PM | 2004 | 31.9 | C |
| Fair Oaks Ave. & California Ave. | AM | 2004 | 12.8 | B |
| | PM | 2004 | 12.1 | B |
| Fair Oaks Ave. & Kifer Rd. | AM | 1/19/2006 | 8.4 | A |
| | PM | 1/19/2006 | 16.2 | B |
| Wolfe Rd. & Stewart Dr. | AM | 2004 | 8.5 | A |
| | PM | 2004 | 10.2 | B |
| Wolfe Rd. & Arques Ave. | AM | 2004 | 18.7 | B |
| | PM | 2004 | 21.2 | C |
| Wolfe Rd. & Central Expwy (N) | AM | 2004 | 11.4 | B |
| | PM | 2004 | 16.2 | B |
| Wolfe Rd. & Central Expwy (S) | AM | 2004 | 8.6 | A |
| | PM | 2004 | 16.2 | B |
| Wolfe Rd. & Kifer Rd. | AM | 2004 | 20.8 | C |
| | PM | 2004 | 31.1 | C |
| De Guigne Dr. & Duane Ave. | AM | 1/17/2006 | 3.8 | A |
| | PM | 1/17/2006 | 8.0 | A |
| Commercial St. & Arques Ave. | AM | 2004 | 13.5 | B |
| | PM | 2004 | 20.2 | C |
| Stewart Dr. & Duane Ave. | AM | 1/17/2006 | 47.7 | D |
| | PM | 1/17/2006 | 39.0 | D |
| Santa Trinita Ave. & Stewart Dr. | AM | 1/17/2006 | 17.5 | B |
| | PM | 1/17/2006 | 18.7 | B |
| Santa Trinita Ave. & Arques Ave. | AM | 1/17/2006 | 9.8 | A |
| | PM | 1/17/2006 | 16.6 | B |
| Lawrence Expwy. & Tasman Dr. | AM | 1/24/2006 | 45.9 | D |
| | PM | 10/26/2004 | 50.7 | D |
| Lawrence Expwy. & Lakehaven Dr. | AM | 1/19/2006 | 61.7 | E |
| | PM | 1/19/2006 | 60.3 | E |
| Lawrence Expwy. & US 101 NB Ramps | AM | 4/6/2005 | 15.7 | B |
| | PM | 4/6/2005 | 17.5 | B |
| Lawrence Expwy. & US 101 SB Ramps | AM | 4/6/2005 | 10.3 | B |
| | PM | 4/6/2005 | 15.2 | B |
| Lawrence Expwy. & Oakmead Pkwy. | AM | 4/6/2005 | 41.4 | D |
| | PM | 4/6/2005 | 49.1 | D |
| Lawrence Expwy. & Arques Ave. | AM | 4/6/2005 | 38.0 | D |
| | PM | 4/6/2005 | 66.3 | E |
| Lawrence Expwy. & Kifer Rd. | AM | 4/6/2005 | 23.0 | C |
| | PM | 4/6/2005 | 50.4 | D |

Notes:
* Denotes a CMP intersection.

# 3.
# Near-Term Background Conditions

This chapter describes background traffic conditions. Background conditions are defined as near-term conditions just prior to completion of the proposed near-term developments. Traffic volumes for background conditions comprise volumes from existing traffic counts plus traffic generated by other approved developments in the vicinity of the site. This chapter describes the procedure used to determine background traffic volumes and the resulting traffic conditions.

## Background Roadway Network

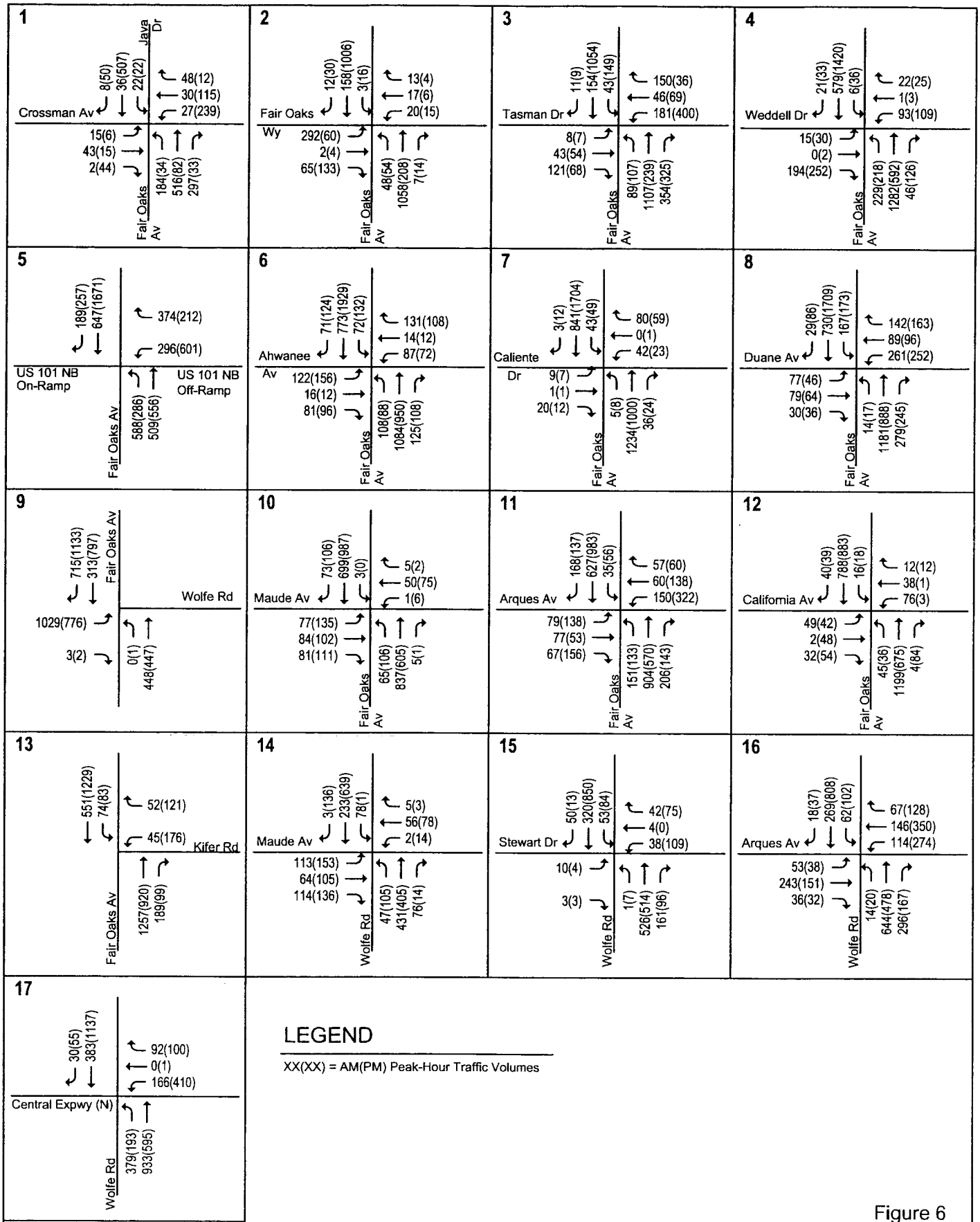
The transportation network under near-term background conditions would be the same as the existing transportation network.

## Background Traffic Volumes

Background traffic volumes were estimated by adding to existing peak hour volumes the projected volumes from approved but not yet completed developments in the project study area. The added traffic from approved but not yet completed developments was estimated based on information provided by the Cities of Sunnyvale and Santa Clara for approved projects within their jurisdictions. Background peak hour traffic volumes are shown on Figure 6. A list of approved projects is included in Appendix B.

## Background Intersection Levels of Service

The results of the intersection level of service analysis under background conditions are summarized in Table 4. The results show that, measured against City of Sunnyvale and CMP standards, all of the signalized study intersections would operate at acceptable levels of service during both the AM and PM peak hours of traffic under near-term background conditions. The level of service calculation sheets are included in Appendix C.




## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 6

# BACKGROUND TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
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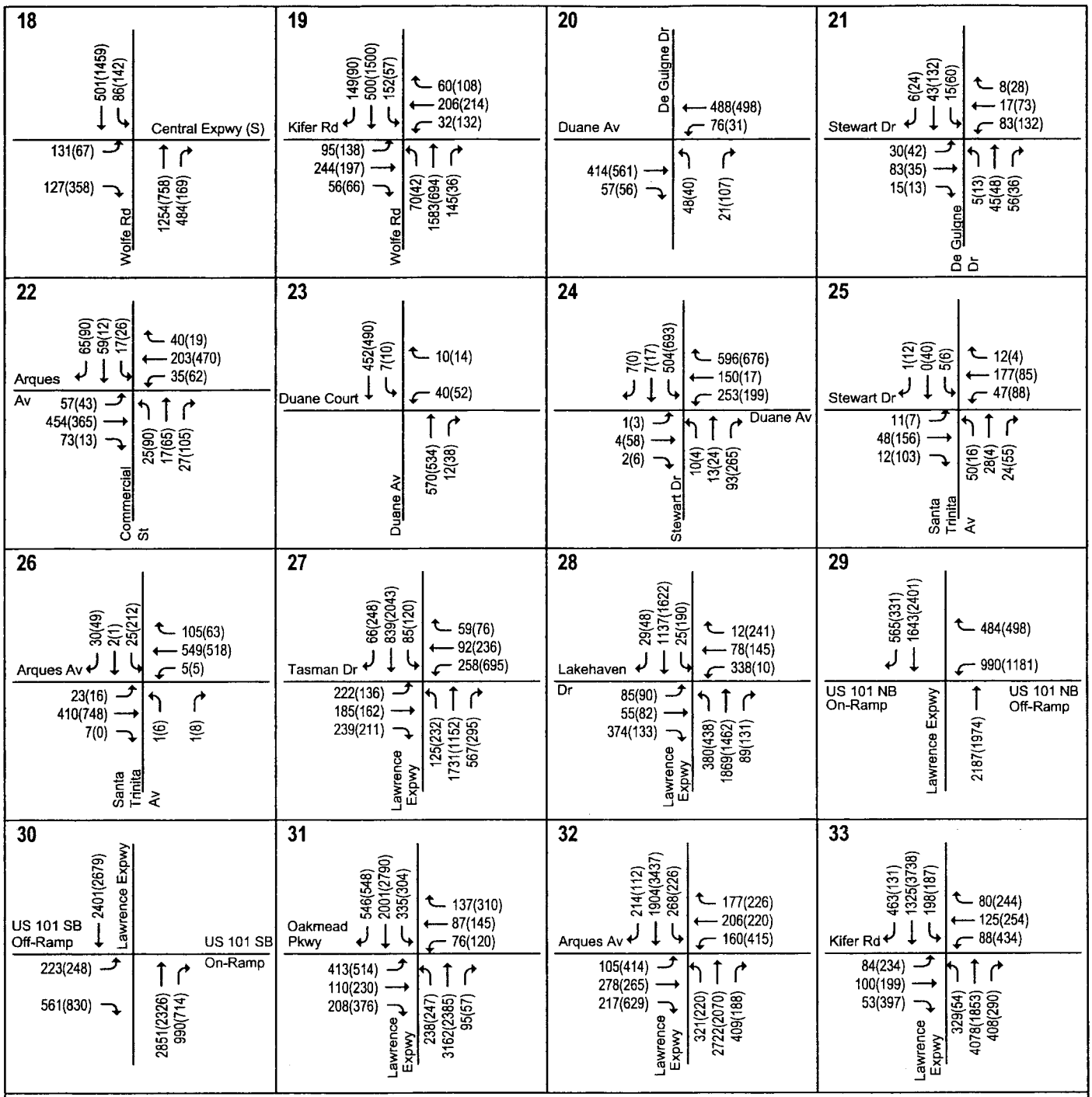



## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 6

# BACKGROUND TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

## Table 4
## Intersection Levels of Service Under Background Conditions

| Intersection | Peak Hour | Existing Ave. Delay | Existing LOS | Background Ave. Delay | Background LOS |
|---|---|---|---|---|---|
| Java Dr. & Crossman Ave. | AM | 18.2 | B | 18.2 | B |
| | PM | 27.0 | C | 27.0 | C |
| Fair Oaks Ave. & Fair Oaks Way | AM | 18.7 | B | 21.5 | C |
| | PM | 20.1 | C | 19.8 | B |
| Fair Oaks Ave. & Tasman Dr. | AM | 19.4 | B | 19.3 | B |
| | PM | 26.3 | C | 26.4 | C |
| Fair Oaks Ave. & Weddell Dr. | AM | 13.3 | B | 13.2 | B |
| | PM | 22.1 | C | 21.8 | C |
| Fair Oaks Ave. & US 101 NB Ramps | AM | 22.5 | C | 24.3 | C |
| | PM | 26.0 | C | 29.8 | C |
| Fair Oaks Ave. & Ahwanee Ave. | AM | 16.8 | B | 16.4 | B |
| | PM | 15.4 | B | 15.1 | B |
| Fair Oaks Ave. & Caliente Dr. | AM | 11.4 | B | 10.9 | B |
| | PM | 7.9 | A | 7.8 | A |
| Fair Oaks Ave. & Duane Ave. | AM | 28.5 | C | 28.4 | C |
| | PM | 23.9 | C | 24.1 | C |
| Fair Oaks Ave. & Wolfe Rd. | AM | 20.7 | C | 21.0 | C |
| | PM | 17.9 | B | 18.3 | B |
| Fair Oaks Ave. & Maude Ave. | AM | 24.0 | C | 23.7 | C |
| | PM | 22.7 | C | 22.8 | C |
| Fair Oaks Ave. & Arques Ave. | AM | 22.6 | C | 24.4 | C |
| | PM | 31.9 | C | 32.5 | C |
| Fair Oaks Ave. & California Ave. | AM | 12.8 | B | 12.5 | B |
| | PM | 12.1 | B | 11.4 | B |
| Fair Oaks Ave. & Kifer Rd. | AM | 8.4 | A | 8.4 | A |
| | PM | 16.2 | B | 16.5 | B |
| Wolfe Rd. & Stewart Dr. | AM | 8.5 | A | 10.2 | B |
| | PM | 10.2 | B | 12.2 | B |
| Wolfe Rd. & Arques Ave. | AM | 18.7 | B | 19.7 | B |
| | PM | 21.2 | C | 22.4 | C |
| Wolfe Rd. & Central Expwy (N) | AM | 11.4 | B | 12.2 | B |
| | PM | 16.2 | B | 16.0 | B |
| Wolfe Rd. & Central Expwy (S) | AM | 8.6 | A | 9.0 | A |
| | PM | 16.2 | B | 16.2 | B |
| Wolfe Rd. & Kifer Rd. | AM | 20.8 | C | 21.5 | C |
| | PM | 31.1 | C | 31.3 | C |
| De Guigne Dr. & Duane Ave. | AM | 3.8 | A | 4.3 | A |
| | PM | 8.0 | A | 7.8 | A |
| Commercial St. & Arques Ave. | AM | 13.5 | B | 13.2 | B |
| | PM | 20.2 | C | 20.0 | C |
| Stewart Dr. & Duane Ave. | AM | 47.7 | D | 47.7 | D |
| | PM | 39.0 | D | 39.0 | D |
| Santa Trinita Ave. & Stewart Dr. | AM | 17.5 | B | 17.5 | B |
| | PM | 18.7 | B | 18.7 | B |
| Santa Trinita Ave. & Arques Ave. | AM | 9.8 | A | 9.9 | A |
| | PM | 16.6 | B | 16.3 | B |
| Lawrence Expwy. & Tasman Dr. | AM | 45.9 | D | 45.9 | D |
| | PM | 50.7 | D | 52.8 | D |
| Lawrence Expwy. & Lakehaven Dr. | AM | 61.7 | E | 61.1 | E |
| | PM | 60.3 | E | 59.3 | E |
| Lawrence Expwy. & US 101 NB Ramps | AM | 15.7 | B | 16.7 | B |
| | PM | 17.5 | B | 18.0 | B |
| Lawrence Expwy. & US 101 SB Ramps | AM | 10.3 | B | 11.3 | B |
| | PM | 15.2 | B | 15.8 | B |
| Lawrence Expwy. & Oakmead Pkwy. | AM | 41.4 | D | 40.6 | D |
| | PM | 49.1 | D | 49.3 | D |
| Lawrence Expwy. & Arques Ave. | AM | 38.0 | D | 41.1 | D |
| | PM | 66.3 | E | 72.0 | E |
| Lawrence Expwy. & Kifer Rd. | AM | 23.0 | C | 27.3 | C |
| | PM | 50.4 | D | 56.2 | E |

Notes:
* Denotes a CMP intersection.

## Signal Warrant Analysis

Peak hour signal warrant checks (*MUTCD 2003 Edition*, Part 4, Warrant 3) were performed for the unsignalized study intersections to determine whether signalization would be justified on the basis of background peak hour volumes. The analysis revealed that the unsignalized intersection of Wolfe Road and Maude Avenue would warrant signalization based on PM peak hour volumes under background conditions. The other two unsignalized intersections would not warrant signalization. The signal warrant sheets are included in Appendix D.

# 4.
# Near-Term Project Traffic Conditions

This chapter describes traffic conditions with the near-term residential projects, including a description of the significance criteria used to establish what constitutes a project impact, a description of the transportation system under project conditions and the method by which project traffic is estimated, and any impacts caused by the near-term projects. One of the two proposed near-term projects, a 250-unit townhouse development, would be constructed on the currently vacant 14-acre AMD site located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection. Access to this project site would be provided via Duane Avenue and DeGuigne Drive. The second proposed near-term project is a Taylor-Woodrow project that would consist of a mix of condominiums and townhouses totaling 304 units. This proposed project would replace approximately 111,300 s.f. of existing light industrial uses on a 7.3-acre site located in the northeast quadrant of the Stewart Drive and Duane Avenue intersection. Access to the Taylor-Woodrow project site would be provided via Duane Avenue and Duane Court.

## Significant Impact Criteria

Significance criteria are used to establish what constitutes an impact. For this analysis, the criteria used to determine impacts on intersections are based on City of Sunnyvale Level of Service and County Congestion Management Program (CMP) standards.

### *Definition of Significant Intersection Impacts*

The project is said to create a significant adverse impact on traffic conditions at a signalized intersection in the City of Sunnyvale if for either peak hour:

1. The level of service at the intersection drops below its respective level of service standard when project traffic is added, or

2. An intersection that operates below its level of service standard under background conditions experiences an increase in critical-movement delay of four (4) or more seconds, *and* the volume-to-capacity ratio (V/C) is increased by .01 or more when project traffic is added.

In addition, City of Sunnyvale policy stipulates that reasonable improvement measures be identified where the addition of project traffic changes the level of service at a local intersection by one or more levels (i.e., LOS B to LOS C).

The definition of a significant impact at a "regionally significant" CMP intersection is the same as for the City of Sunnyvale, except that the CMP standard for acceptable level of service is LOS E or better. In the study area, all regionally significant signalized intersections are located on Lawrence Expressway. A significant impact by City of Sunnyvale and CMP standards is said to be satisfactorily mitigated when measures are implemented that would restore intersection conditions to its LOS standard *or* to an average delay better than background conditions.

The City of Sunnyvale has not established a policy for determining significant adverse traffic impacts at unsignalized intersections.

## Transportation Network Under Near-Term Project Conditions

The City of Sunnyvale has stipulated that the following roadway improvement be implemented by the developers under near-term project conditions:

***Duane Avenue and DeGuigne Drive.*** Improvements consist of reconfiguring this intersection, including the removal of the pork-chop island on the west approach. Removal of the pork chop island would result in loss of the separate eastbound right-turn lane.

One or both of the proposed near-term projects may be required to pay a fee based on a fair share contribution toward the intersection improvement. The City ultimately will make this determination. With the exception of the roadway improvement described above, it is assumed in this analysis that the transportation network under near-term project conditions, including roadways and intersection lane configurations, would be the same as that described under background conditions.

## Near-Term Project Trip Estimates

The magnitude of traffic produced by a new development and the locations where that traffic would appear are estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In determining project trip generation, the magnitude of traffic entering and exiting the site is estimated for the AM and PM peak hours. As part of the project trip distribution, an estimate is made of the directions to and from which the project trips would travel. In the project trip assignment, the project trips are assigned to specific streets and intersections. These procedures are described below.

### *Trip Generation*

Through empirical research, data have been collected that correlate to common land uses their propensity for producing traffic. Thus, for the most common land uses there are standard trip generation rates that can be applied to help predict the future traffic increases that would result from a new development. The magnitude of traffic added to the roadway system by a particular development is estimated by multiplying the applicable trip generation rates by the size of the development. The standard trip generation rates are published in the Institute of Transportation Engineers (ITE) manual entitled *Trip Generation*, Seventh Edition, 2003.

The 250-unit townhouse development would be constructed on the currently vacant 14-acre AMD site located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection. The 304-unit Taylor-Woodrow condominium/townhouse development would replace the existing light industrial uses currently on the 7.3-acre site located in the northeast quadrant of the Duane Avenue and Stewart Drive intersection. Therefore, the trips generated by the existing light industrial uses were estimated and subtracted at each intersection before project trips were added to the roadway network.

After applying the standard trip generation rates to the proposed residential developments, it is estimated that the developments would generate 3,246 gross daily vehicle trips, with 244 gross trips occurring during the AM peak hour and 288 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, the projects would generate 2,343 net daily trips, with 106 new trips occurring during the AM peak hour and 167 new trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the residential projects would produce 73 fewer inbound and 179 new outbound trips during the AM peak hour, and 175 new inbound and 8 fewer outbound trips during the PM peak hour. The project trip generation estimates are presented below in Table 5.

**Table 5**
**Near-Term Project Trip Generation Estimates**

| | | | | | AM Peak Hour | | | | | | PM Peak Hour | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Land Use | Size | ITE Land Use Code | Daily Rate[1] | Daily Trips | Rate | % In | % Out | In | Out | Total | Rate | % In | % Out | In | Out | Total |
| ***Existing Use*** | | | | | | | | | | | | | | | | |
| Research and Development *7.3 Acres @ 0.35 FAR* | 111.29 ksf | 760 | 8.11 | 903 | 1.24 | 83% | 17% | 115 | 23 | 138 | 1.08 | 15% | 85% | 18 | 103 | 121 |
| ***Proposed Uses*** | | | | | | | | | | | | | | | | |
| Condominium/Townhouse *Taylor Woodrow Site (7.3 Acres)* | 304 units | 230 | 5.86 | 1,781 | 0.44 | 17% | 83% | 23 | 111 | 134 | 0.52 | 67% | 33% | 106 | 52 | 158 |
| Condominium/Townhouse *AMD Site (14 Acres)* | 250 units | 230 | 5.86 | 1,465 | 0.44 | 17% | 83% | 19 | 91 | 110 | 0.52 | 67% | 33% | 87 | 43 | 130 |
| **Net Trip Generation:** | | | | **2,343** | | | | **-73** | **179** | **106** | | | | **175** | **-8** | **167** |

Source: ITE Trip Generation Manual, Seventh Edition. (Average rates were used.)

## *Trip Distribution and Assignment*

The trip distribution pattern for the existing light industrial uses is shown on Figure 7 and is based on a select zone analysis from the City of Sunnyvale 2020 transportation model. The peak hour trips generated by the existing light industrial uses were subtracted from each of the study intersections based on this distribution pattern before the estimated near-term project trips were added. The peak hour trips generated by the near-term residential projects were then assigned to the roadway network in accordance with the residential trip distribution pattern shown on Figure 8. The residential trip distribution pattern also is based on a select zone analysis from the City of Sunnyvale 2020 transportation model. Figure 9 shows the net near-term project trips at the study intersections.

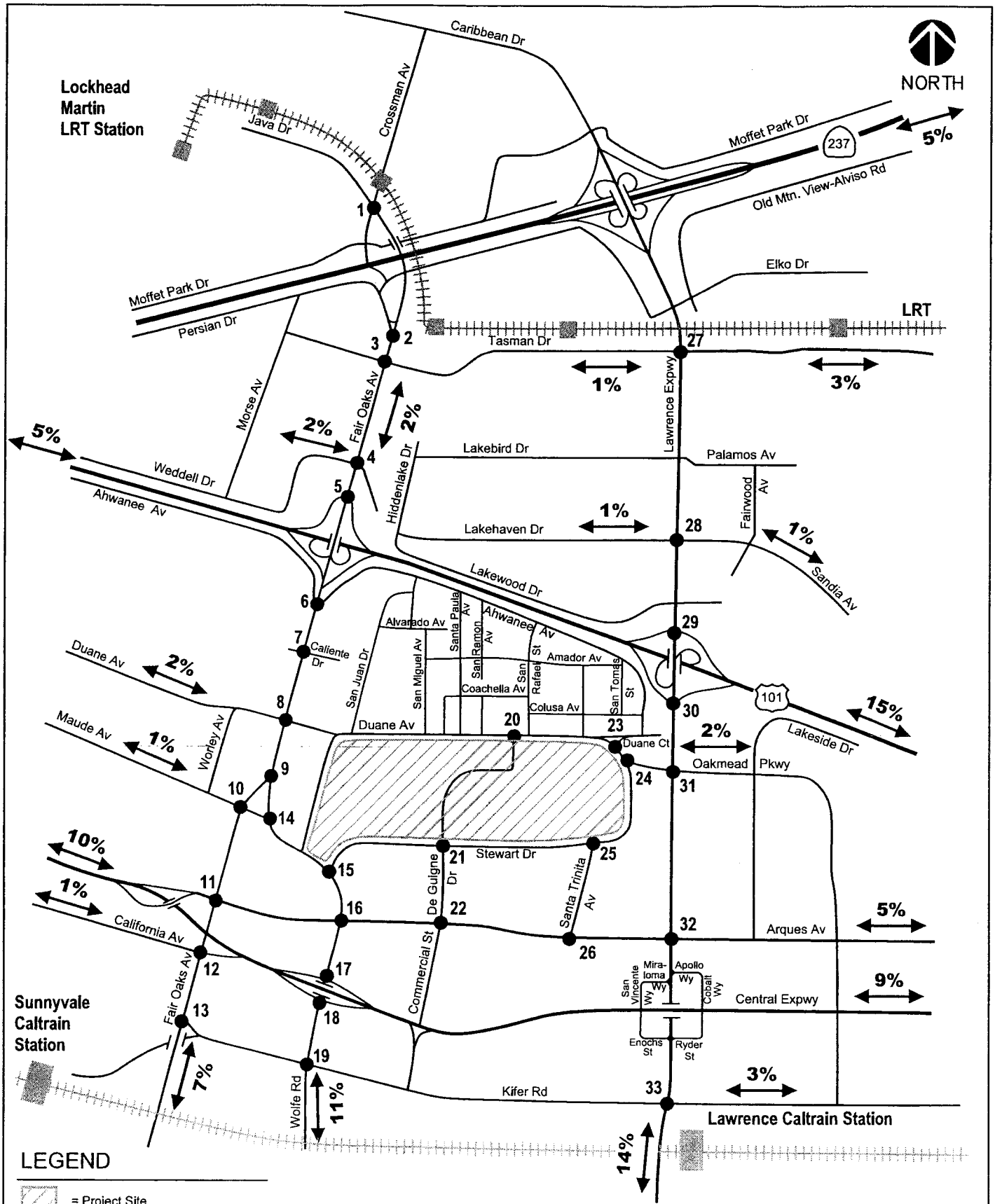



Figure 7

# INDUSTRIAL TRIP DISTRIBUTION

East Sunnyvale ITR

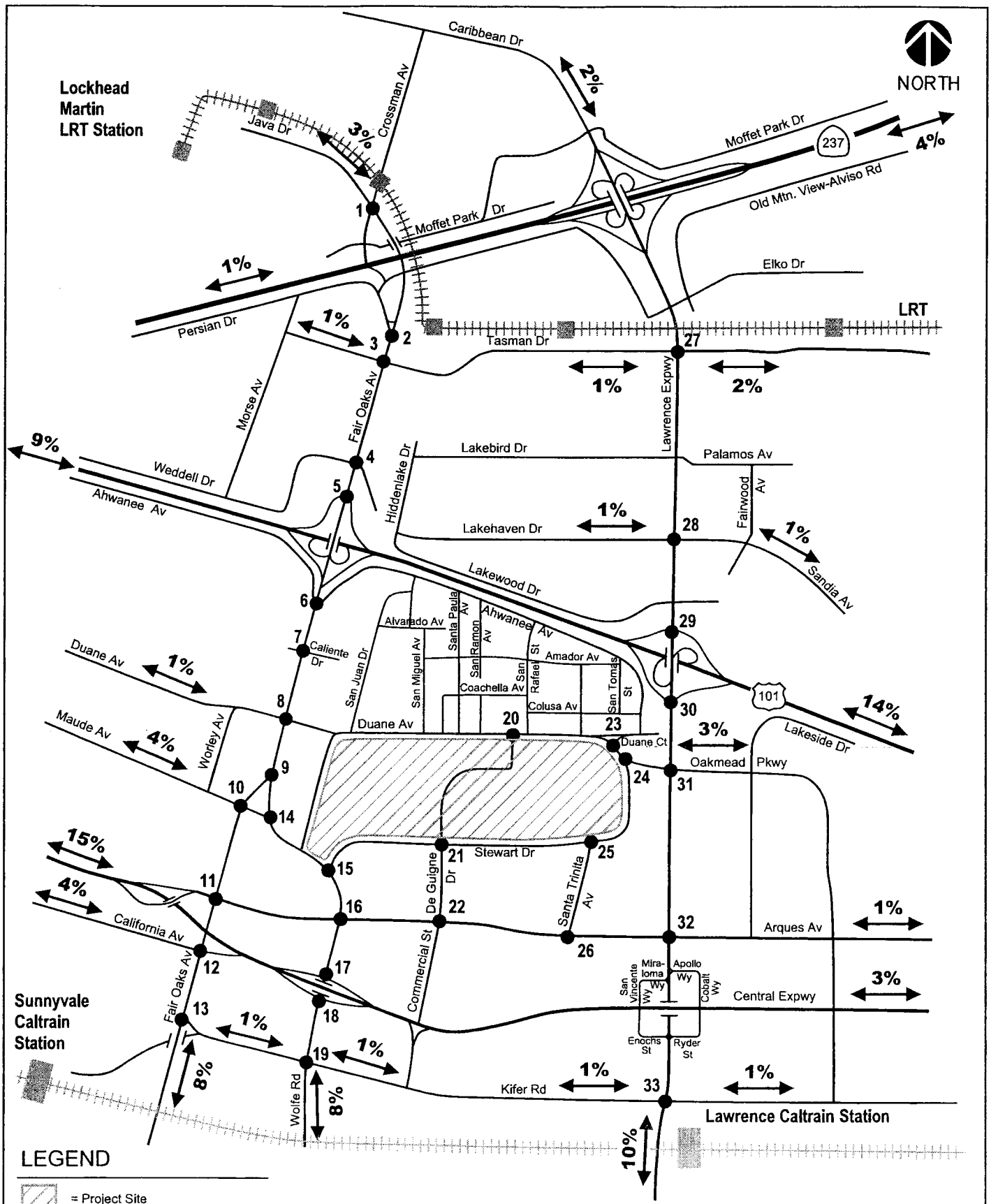



Figure 8

# RESIDENTIAL TRIP DISTRIBUTION

East Sunnyvale ITR

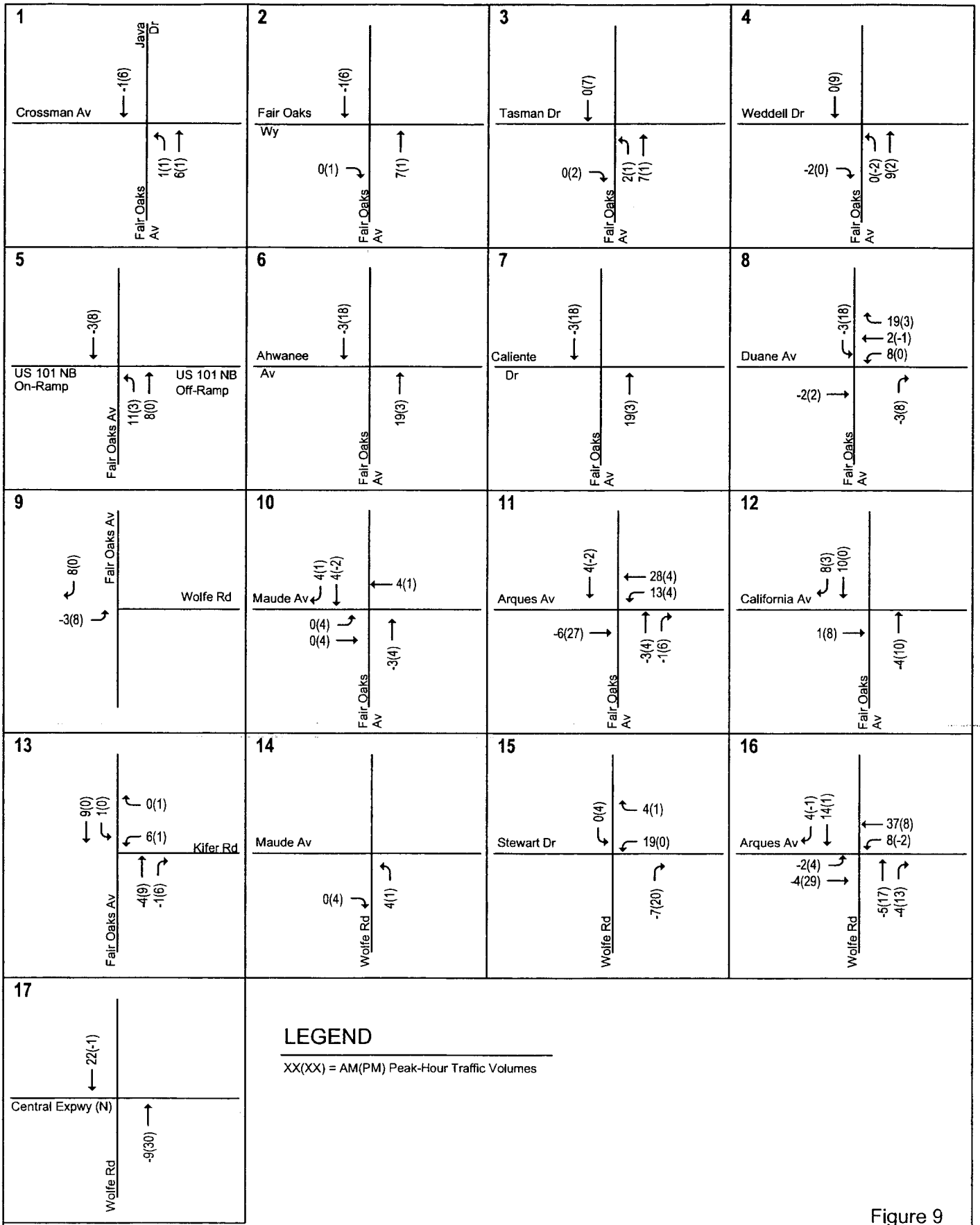
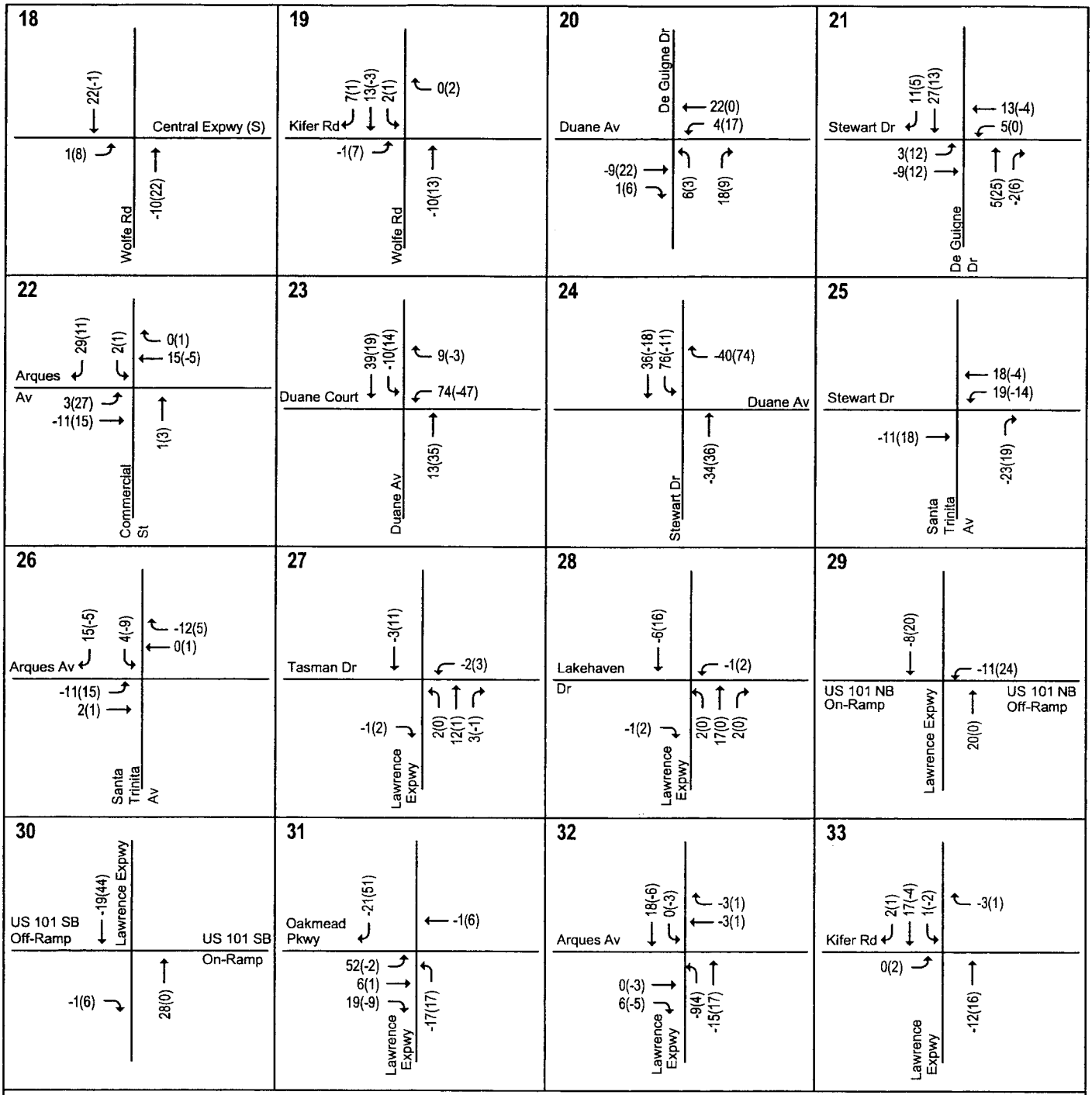



Figure 9

# NET NEAR-TERM PROJECT TRIPS

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.




## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 9

# NET NEAR-TERM PROJECT TRIPS

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

## Near-Term Project Traffic Volumes

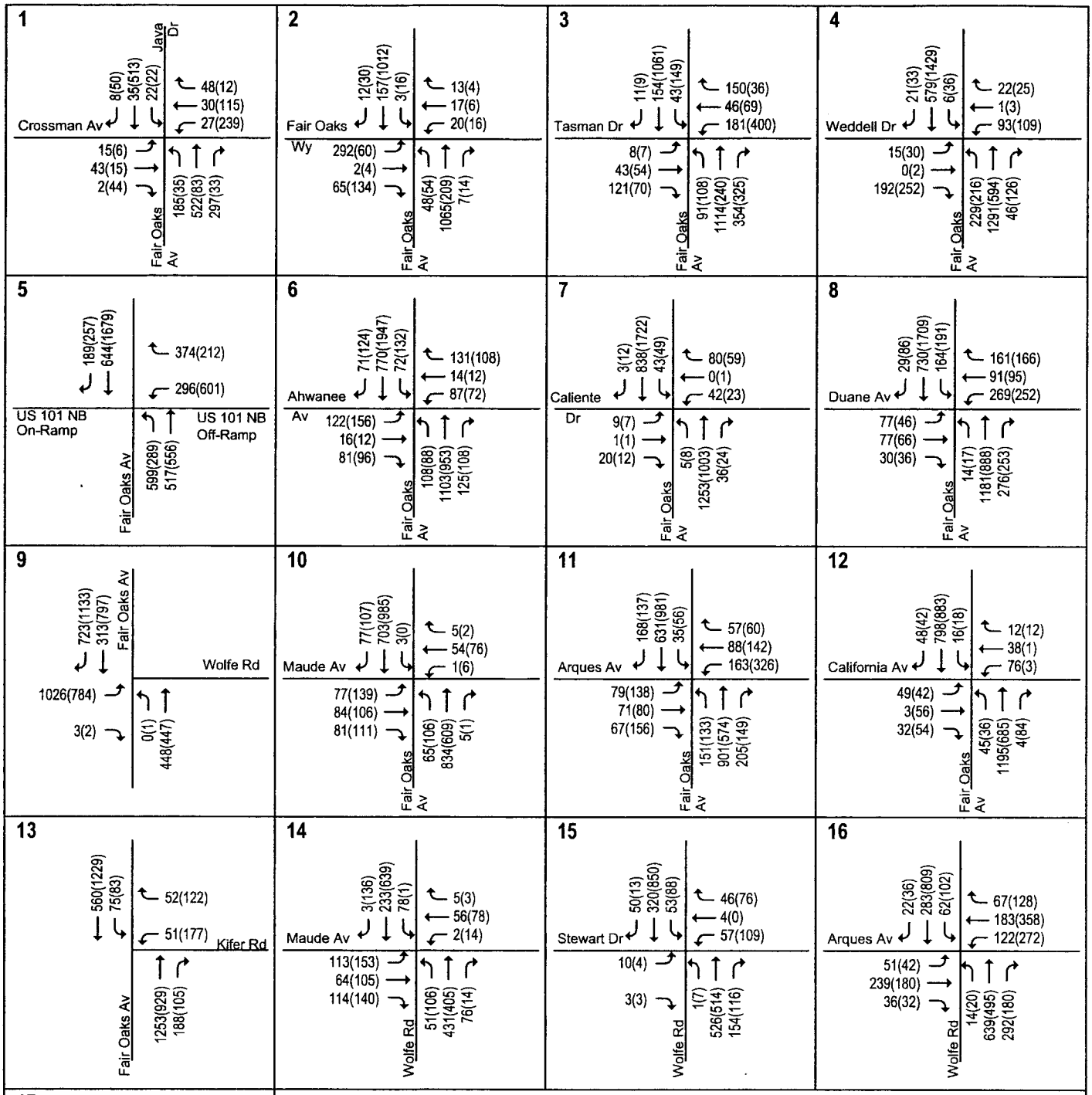
Projected peak hour traffic volumes with the near-term projects (hereafter called *project traffic volumes*) were estimated by subtracting from background traffic volumes the trips currently generated by the existing light industrial uses, and adding the estimated traffic generated by the proposed residential developments. Project conditions were evaluated relative to background conditions in order to determine potential near-term project impacts. The net near-term project traffic volumes are shown graphically on Figure 10.

## Near-Term Project Intersection Levels of Service

The results of the signalized intersection level of service analysis under near-term project conditions are summarized in Table 6. The results show that, measured against City of Sunnyvale and County CMP standards, none of the signalized study intersections would be significantly impacted by the near-term projects.

According to CMP standards, both CMP study intersections would operate at acceptable levels of service (LOS E or better) during the AM and PM peak hours under near-term project conditions.

The level of service calculation sheets are included in Appendix C.




## LEGEND

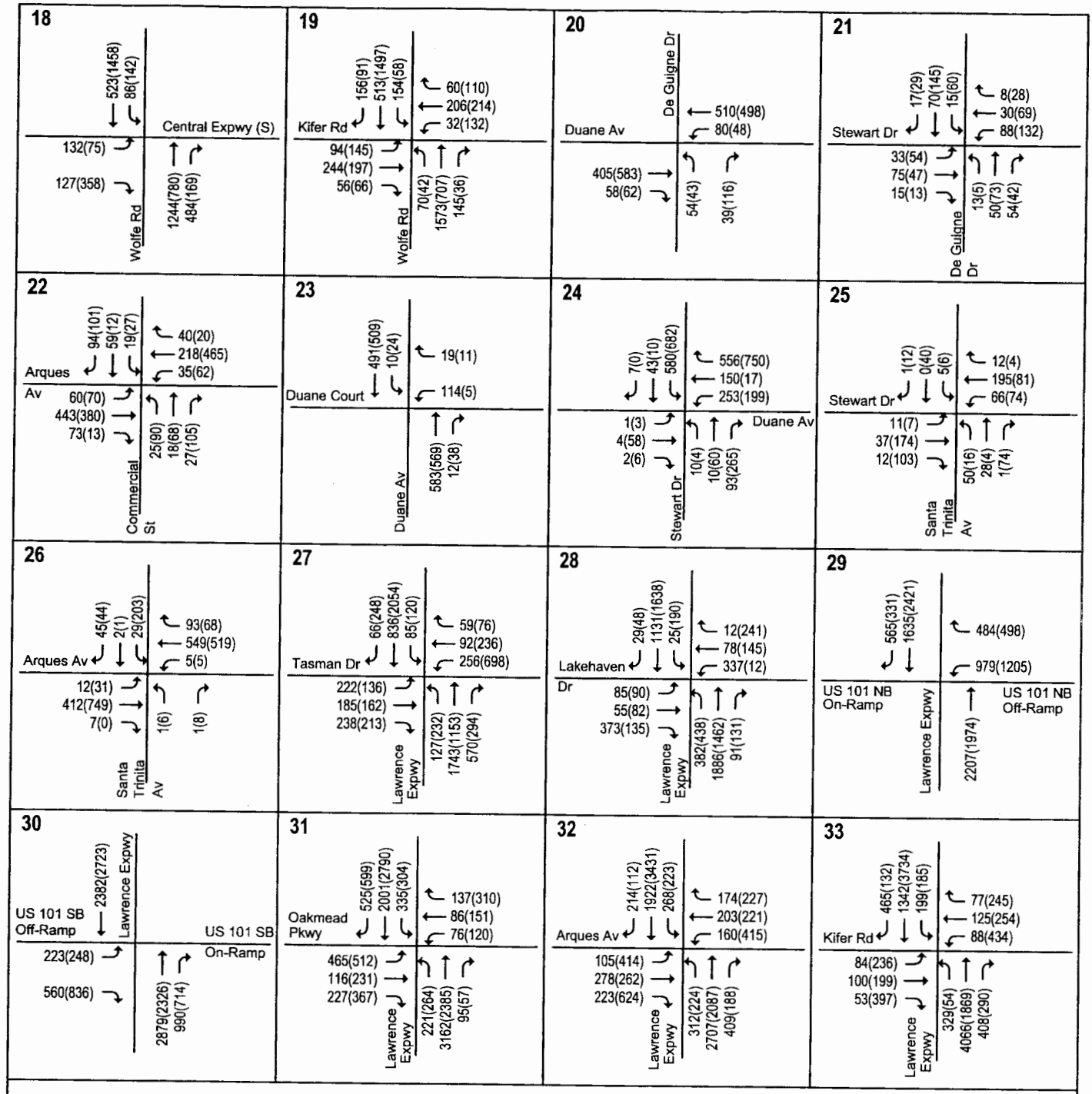
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 10

# NEAR-TERM PROJECT CONDITIONS TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.




## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 10

# NEAR-TERM PROJECT CONDITIONS TRAFFIC VOLUMES

Hexagon
Transportation Consultants, Inc.

East Sunnyvale ITR

## Table 6
## Intersection Levels of Service Under Near-Term Project Conditions

| Intersection | Peak Hour | Background Ave. Delay | Background LOS | Near-Term Project Ave. Delay | Near-Term Project LOS | Increases Crit.Delay | Increases Crit.V/C |
|---|---|---|---|---|---|---|---|
| Java Dr. & Crossman Ave. | AM | 18.2 | B | 18.2 | B | -0.1 | 0.000 |
| | PM | 27.0 | C | 27.0 | C | 0.0 | 0.002 |
| Fair Oaks Ave. & Fair Oaks Way | AM | 21.5 | C | 21.5 | C | 0.0 | 0.002 |
| | PM | 19.8 | B | 19.8 | B | 0.0 | 0.002 |
| Fair Oaks Ave. & Tasman Dr. | AM | 19.3 | B | 19.3 | B | 0.0 | 0.002 |
| | PM | 26.4 | C | 26.5 | C | 0.0 | 0.002 |
| Fair Oaks Ave. & Weddell Dr. | AM | 13.2 | B | 13.2 | B | -0.1 | 0.001 |
| | PM | 21.8 | C | 21.8 | C | -0.1 | 0.001 |
| Fair Oaks Ave. & US 101 NB Ramps | AM | 24.3 | C | 24.4 | C | 0.2 | 0.006 |
| | PM | 29.8 | C | 30.1 | C | 0.4 | 0.004 |
| Fair Oaks Ave. & Ahwanee Ave. | AM | 16.4 | B | 16.3 | B | -0.1 | 0.005 |
| | PM | 15.1 | B | 15.1 | B | 0.0 | 0.004 |
| Fair Oaks Ave. & Caliente Dr. | AM | 10.9 | B | 10.9 | B | 0.0 | 0.006 |
| | PM | 7.8 | A | 7.7 | A | 0.0 | 0.004 |
| Fair Oaks Ave. & Duane Ave. | AM | 28.4 | C | 28.5 | C | 0.0 | -0.001 |
| | PM | 24.1 | C | 24.4 | C | 0.9 | 0.015 |
| Fair Oaks Ave. & Wolfe Rd. | AM | 21.0 | C | 21.0 | C | 0.1 | 0.002 |
| | PM | 18.3 | B | 18.4 | B | 0.1 | 0.003 |
| Fair Oaks Ave. & Maude Ave. | AM | 23.7 | C | 23.7 | C | 0.0 | -0.001 |
| | PM | 22.8 | C | 23.0 | C | 0.2 | 0.002 |
| Fair Oaks Ave. & Arques Ave. | AM | 24.4 | C | 25.9 | C | 5.3 | 0.048 |
| | PM | 32.5 | C | 33.3 | C | 1.2 | 0.018 |
| Fair Oaks Ave. & California Ave. | AM | 12.5 | B | 12.5 | B | 0.0 | -0.001 |
| | PM | 11.4 | B | 11.6 | B | 0.3 | 0.003 |
| Fair Oaks Ave. & Kifer Rd. | AM | 8.4 | A | 8.6 | A | 0.3 | 0.003 |
| | PM | 16.5 | B | 16.5 | B | 0.1 | 0.001 |
| Wolfe Rd. & Stewart Dr. | AM | 10.2 | B | 11.5 | B | 1.5 | 0.012 |
| | PM | 12.2 | B | 12.3 | B | 0.0 | 0.000 |
| Wolfe Rd. & Arques Ave. | AM | 19.7 | B | 20.0 | B | 0.1 | 0.000 |
| | PM | 22.4 | C | 22.5 | C | 0.1 | 0.005 |
| Wolfe Rd. & Central Expwy (N) | AM | 12.2 | B | 12.4 | B | 0.2 | 0.003 |
| | PM | 16.0 | B | 15.9 | B | 0.0 | 0.000 |
| Wolfe Rd. & Central Expwy (S) | AM | 9.0 | A | 9.0 | A | 0.0 | 0.000 |
| | PM | 16.2 | B | 16.2 | B | 0.0 | 0.000 |
| Wolfe Rd. & Kifer Rd. | AM | 21.5 | C | 21.5 | C | 0.0 | -0.001 |
| | PM | 31.3 | C | 31.5 | C | 0.5 | 0.005 |
| De Guigne Dr. & Duane Ave. | AM | 4.3 | A | 5.1 | A | 0.3 | 0.011 |
| | PM | 7.8 | A | 8.1 | A | 0.3 | 0.010 |
| Commercial St. & Arques Ave. | AM | 13.2 | B | 14.0 | B | 1.0 | 0.017 |
| | PM | 20.0 | C | 20.6 | C | 1.2 | 0.018 |
| Stewart Dr. & Duane Ave. | AM | 47.7 | D | 37.4 | D | -15.7 | 0.015 |
| | PM | 39.0 | D | 51.0 | D | 14.8 | 0.068 |
| Santa Trinita Ave. & Stewart Dr. | AM | 17.5 | B | 17.4 | B | 0.0 | 0.012 |
| | PM | 18.7 | B | 18.6 | B | -0.2 | 0.016 |
| Santa Trinita Ave. & Arques Ave. | AM | 9.9 | A | 9.9 | A | -0.2 | -0.005 |
| | PM | 16.3 | B | 16.2 | B | -0.3 | -0.005 |
| Lawrence Expwy. & Tasman Dr. | AM | 45.9 | D | 45.9 | D | 0.0 | -0.001 |
| | PM | 52.8 | D | 52.9 | D | 0.2 | 0.004 |
| Lawrence Expwy. & Lakehaven Dr. | AM | 61.1 | E | 61.0 | E | 0.0 | -0.001 |
| | PM | 59.3 | E | 59.3 | E | 0.0 | 0.002 |
| Lawrence Expwy. & US 101 NB Ramps | AM | 16.7 | B | 16.6 | B | -0.1 | 0.000 |
| | PM | 18.0 | B | 18.2 | B | 0.2 | 0.008 |
| Lawrence Expwy. & US 101 SB Ramps | AM | 11.3 | B | 11.3 | B | 0.0 | 0.004 |
| | PM | 15.8 | B | 15.8 | B | 0.1 | 0.008 |
| Lawrence Expwy. & Oakmead Pkwy. | AM | 40.6 | D | 42.2 | D | 2.4 | 0.017 |
| | PM | 49.3 | D | 49.3 | D | 0.6 | 0.005 |
| Lawrence Expwy. & Arques Ave. | AM | 41.1 | D | 41.0 | D | -0.5 | 0.000 |
| | PM | 72.0 | E | 71.5 | E | -0.7 | -0.004 |
| Lawrence Expwy. & Kifer Rd. | AM | 27.3 | C | 27.3 | C | 0.0 | -0.002 |
| | PM | 56.2 | E | 56.1 | E | -0.1 | -0.001 |

Notes:
* Denotes a CMP intersection.

# 5.
# Future 2020 Traffic Conditions

This chapter describes future 2020 baseline traffic conditions and the long-range General Plan Amendment (GPA) traffic conditions associated with the conversion of light industrial to residential (ITR) land uses on approximately 129 acres of land. The 129-acre GPA site is generally bordered by Duane Avenue, Stewart Drive, Britton Avenue and Lawrence Expressway. The ITR designation on these sites allows for the continuation or expansion of existing light industrial and commercial uses, as well as the construction of new low-medium-, medium-, and high-density residential housing. On the GPA site, the conversion to residential uses would be implemented with the R-2 (Low-Medium Density Residential, 10 to 12 DU/AC), R-3 (Medium Density Residential, 13 to 24 DU/AC), R-4 (High Density Residential, 25 to 36 DU/AC), and Retail zoning designations.

GPA Scenario 1 – full buildout of the site – involves converting 129.23 acres of light industrial uses to 119.66 acres of residential development (R-3 and R-4 zoning), plus 9.57 acres of commercial development. Scenario 1 would result in 2,842 new dwelling units and 104,220 square feet (s.f.) of retail development. GPA Scenario 2 – reduced density alternative – involves converting 129.23 acres of light industrial uses to 119.66 acres of residential development at a lower overall density (R-2 and R-3 zoning), plus 9.57 acres of commercial development. Scenario 2 would result in 1,395 new dwelling units and 104,220 square feet (s.f.) of retail development. GPA Scenario 3 – smaller site alternative – involves converting 84.11 acres of light industrial uses to 84.11 acres of residential development (R-3 and R-4 zoning), which would result in 2,049 new units.

## Trip Generation

The standard trip generation rates, published in the Institute of Transportation Engineers (ITE) manual entitled *Trip Generation*, Seventh Edition, 2003, were used to determine the amount of net traffic generated by each of the three potential GPA scenarios. Since each GPA scenario involves converting light industrial land to residential uses, trips currently being generated by the light industrial uses were first estimated and then subtracted at each intersection before the estimated residential trips for each GPA scenario were added to the roadway network. The trip generation estimates are presented below in Table 7 for each long-range GPA scenario.

## Table 7
## Long-Range GPA Trip Generation Estimates

| Land Use | Size | ITE Land Use Code | Daily Rate[1] | Daily Trips | AM Peak Hour | | | | | | PM Peak Hour | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Rate | % In | % Out | In | Out | Total | Rate | % In | % Out | In | Out | Total |
| **Existing Light Industrial Uses** | | | | | | | | | | | | | | | | |
| ***To Be Replaced Under GPA S1 & S2:*** | | | | | | | | | | | | | | | | |
| Research and Development *(129.23 Acres @ 0.35 FAR)* | 1,970.24 ksf | 760 | 8.11 | -15,979 | 1.24 | 83% | 17% | -2028 | -415 | -2443 | 1.08 | 15% | 85% | -319 | -1809 | -2128 |
| ***To Be Replaced Under GPA Scenario 3:*** | | | | | | | | | | | | | | | | |
| Research and Development *(84.11 Acres @ 0.35 FAR)* | 1,282.35 ksf | 760 | 8.11 | -10,400 | 1.24 | 83% | 17% | -1320 | -270 | -1590 | 1.08 | 15% | 85% | -208 | -1177 | -1385 |
| ***GPA Scenario 1*** | | | | | | | | | | | | | | | | |
| Condominium/Townhouse *(2,842 units)* | 2,842 units | 230 | 5.86 | 16,654 | 0.44 | 17% | 83% | 213 | 1,038 | 1,251 | 0.52 | 67% | 33% | 990 | 488 | 1,478 |
| Retail *(9.57 Acres @ 0.25 FAR)* | 104.22 ksf | 820 | 42.94 | 4,475 | 1.03 | 61% | 39% | 66 | 42 | 108 | 3.75 | 48% | 52% | 188 | 203 | 391 |
| ***GPA Scenario 2*** | | | | | | | | | | | | | | | | |
| Condominium/Townhouse *(1,395 units)* | 1,395 units | 230 | 5.86 | 8,175 | 0.44 | 17% | 83% | 104 | 510 | 614 | 0.52 | 67% | 33% | 486 | 239 | 725 |
| Retail *(9.57 Acres @ 0.25 FAR)* | 104.22 ksf | 820 | 42.94 | 4,475 | 1.03 | 61% | 39% | 66 | 42 | 108 | 3.75 | 48% | 52% | 188 | 203 | 391 |
| ***GPA Scenario 3*** | | | | | | | | | | | | | | | | |
| Condominium/Townhouse *(2,049 units)* | 2,049 units | 230 | 5.86 | 12,007 | 0.44 | 17% | 83% | 153 | 749 | 902 | 0.52 | 67% | 33% | 714 | 352 | 1,066 |

| **Net Trip Generation:** | Net Daily Trips | AM Peak Hour | | | PM Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | In | Out | Total | In | Out | Total |
| **GPA Scenraio 1 - Proposed Project:** | **5,150** | **-1,749** | **665** | **-1,084** | **859** | **-1,118** | **-259** |
| **GPA Scenraio 2 - Reduced Density:** | **-3,329** | **-1,858** | **137** | **-1,721** | **355** | **-1,367** | **-1,012** |
| **GPA Scenraio 3 - Smaller Site:** | **1,607** | **-1,167** | **479** | **-688** | **506** | **-825** | **-319** |

Source: ITE Trip Generation Manual, Seventh Edition. (Average rates were used.)

### *GPA Scenario 1*

The GPA Scenario 1 would generate 21,129 gross daily vehicle trips, with 1,359 gross trips occurring during the AM peak hour and 1,869 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, GPA Scenario 1 would generate 5,150 net new daily trips, with 1,084 fewer trips occurring during the AM peak hour and 259 fewer trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the GPA Scenario 1 would produce 1,749 fewer inbound and 665 new outbound trips during the AM peak hour, and 859 new inbound and 1,118 fewer outbound trips during the PM peak hour.

### *GPA Scenario 2*

The GPA Scenario 2 would generate 12,650 gross daily vehicle trips, with 722 gross trips occurring during the AM peak hour and 1,116 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, GPA Scenario 2 would generate 3,329 net fewer daily trips, with 1,721 fewer trips occurring during the AM peak hour and 1,012 fewer trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the GPA Scenario 2 would produce 1,858 fewer inbound and 137 new outbound trips during the AM peak hour, and 355 new inbound and 1,367 fewer outbound trips during the PM peak hour.

### *GPA Scenario 3*

The GPA Scenario 3 would generate 12,007 gross daily vehicle trips, with 902 gross trips occurring during the AM peak hour and 1,066 gross trips occurring during the PM peak hour. After subtracting out the traffic being generated by the existing light industrial uses to be replaced, GPA Scenario 3 would generate 1,607 net new daily trips, with 688 fewer trips occurring during the AM peak hour and 319 fewer trips occurring during the PM peak hour. Using the ITE specified inbound/outbound splits, the GPA Scenario 3 would produce 1,167 fewer inbound and 479 new outbound trips during the AM peak hour, and 506 new inbound and 825 fewer outbound trips during the PM peak hour.

## Trip Distribution and Assignment

The trip distribution pattern for the existing light industrial uses is based on a select zone analysis from the City of Sunnyvale 2020 transportation model. The peak hour trips generated by the existing light industrial uses were subtracted from each of the study intersections based on the light industrial trip distribution pattern (contained in Chapter 4) before the estimated trips for each GPA scenario were added. The peak hour trips generated by each GPA scenario were then assigned to the roadway network in accordance with the residential trip distribution pattern contained in Chapter 4. The residential trip distribution also is based on a select zone analysis from the City of Sunnyvale 2020 transportation model.

## Transportation Network Under Future 2020 Conditions

It is assumed in this analysis that the transportation network under future 2020 conditions, including roadways and intersection lane configurations, would be the same as that described under background conditions (Chapter 3) with the following exceptions:

- Fair Oaks Avenue and Arques Avenue (funded improvement) – An exclusive southbound right-turn lane will be added per the City's Transportation Strategic Program.

- Lawrence Expressway and Arques Avenue (funded improvement) – Lawrence Expressway and Arques Avenue will be grade-separated per the City's Transportation Strategic Program.

It should be noted that for the purpose of this study, the traffic operations at the Lawrence Expressway and Arques Avenue intersection under future 2020 conditions were analyzed based on the existing lane configuration. The future intersection configuration with the grade separation is unknown at this time and will require a detailed design study.

## Future 2020 Traffic Volumes and Significance Criteria

Three GPA land use scenarios were analyzed for potentially significant impacts. Refined Year 2020 baseline volumes were taken directly from the City of Sunnyvale's transportation model forecasts for the Transportation Strategic Plan (TSP). The forecast volumes were further refined for each study intersection not included in the TSP to produce peak hour 2020 volumes for all of the study intersections (see Figure 11). The net traffic volumes associated with the GPA scenarios were estimated and added to the adjusted 2020 forecast volumes for each GPA scenario. The resulting peak hour volumes for GPA Scenarios 1, 2 and 3 are shown in Figures 12, 13 and 14, respectively.

An intersection level of service analysis was conducted to determine if any of the GPA scenarios would result in significant negative traffic impacts. For the long-range GPA level of service analysis, the criteria used to determine impacts on intersections were based on the City of Sunnyvale Level of Service and County Congestion Management Program (CMP) standards as described in Chapter 4 of this report. The traffic conditions under each long-range GPA scenario were evaluated relative to 2020 baseline conditions in order to determine potential long-range traffic impacts.

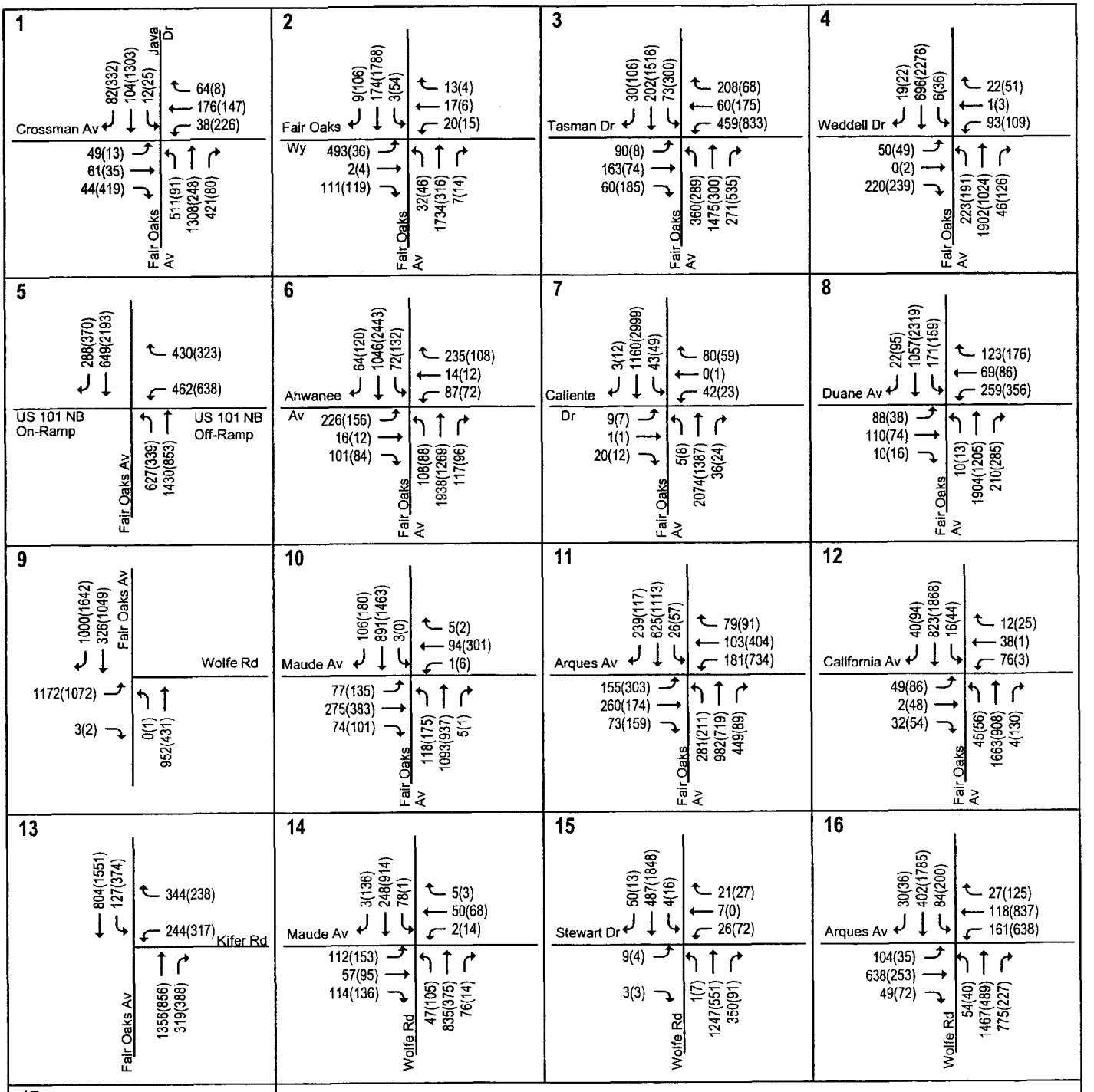
## Long-Range GPA Intersection Levels of Service

The results of the signalized intersection level of service analysis under each of the long-range GPA scenarios are summarized in Table 8. The level of service calculation sheets are included in Appendix C. Note that the levels of service at some of the study intersections improve under the future GPA scenarios when compared to 2020 baseline conditions. This is because future GPA scenarios involve replacing light industrial uses with residential uses. As a result, the GPA site would experience fewer inbound trips in the AM and fewer outbound trips in the PM. The shift in travel patterns would result in lower approach volumes at some of the study intersections, which correspondingly improves the level of service.

According to CMP standards, both CMP study intersections would operate at acceptable levels of service (LOS E or better) during the AM and PM peak hours under all three long-range GPA scenarios.

Measured against City of Sunnyvale standards, the following signalized study intersections would be significantly impacted by one or more of the GPA scenarios as indicated below:

- Fair Oaks Avenue and Arques Avenue – GPA Scenario 1, PM peak hour
- Stewart Drive and Duane Avenue – GPA Scenarios 1 and 3, PM peak hour




## LEGEND

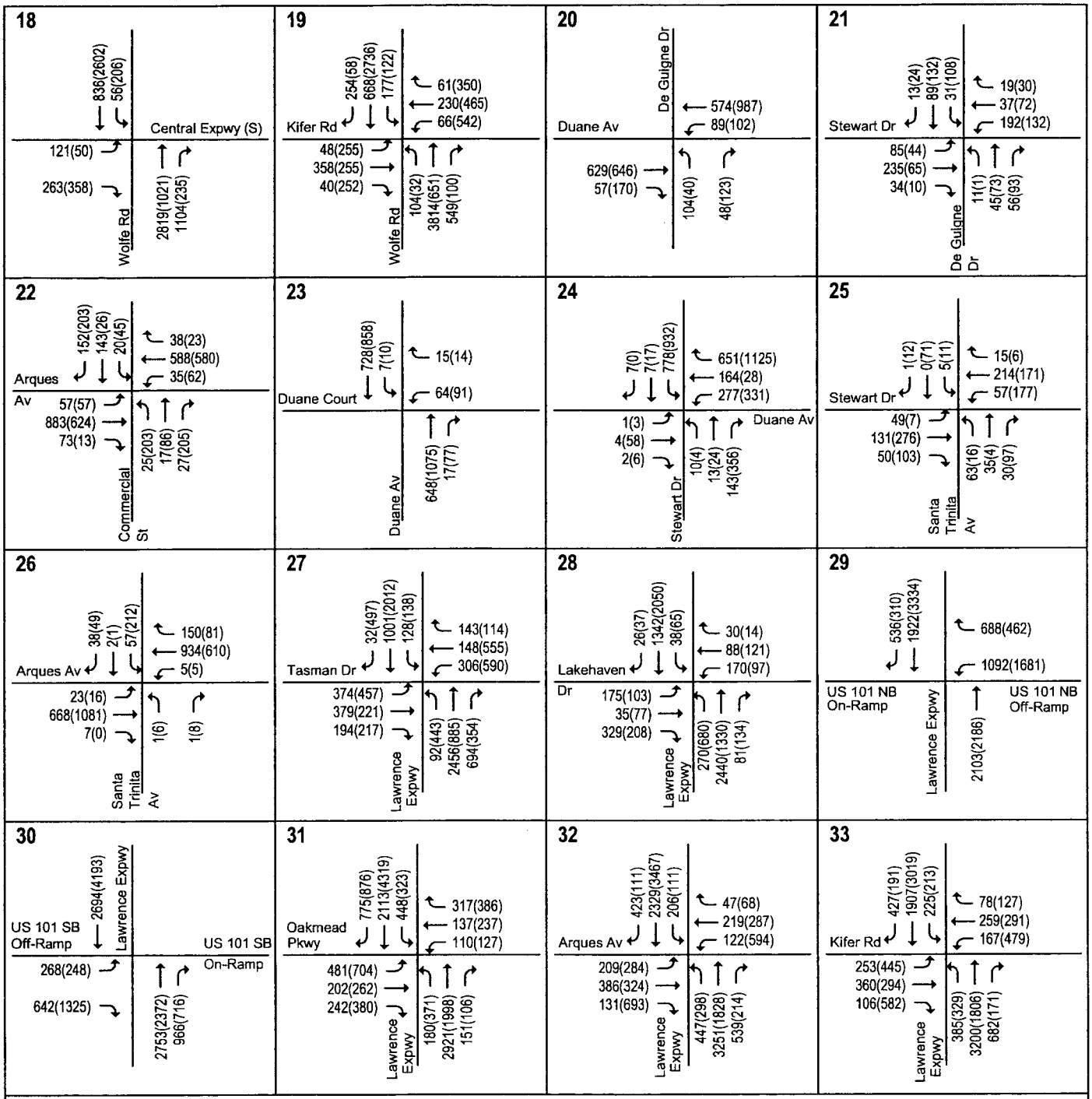
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 11

# YEAR 2020 BASELINE TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.




## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 11

# YEAR 2020 BASELINE TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

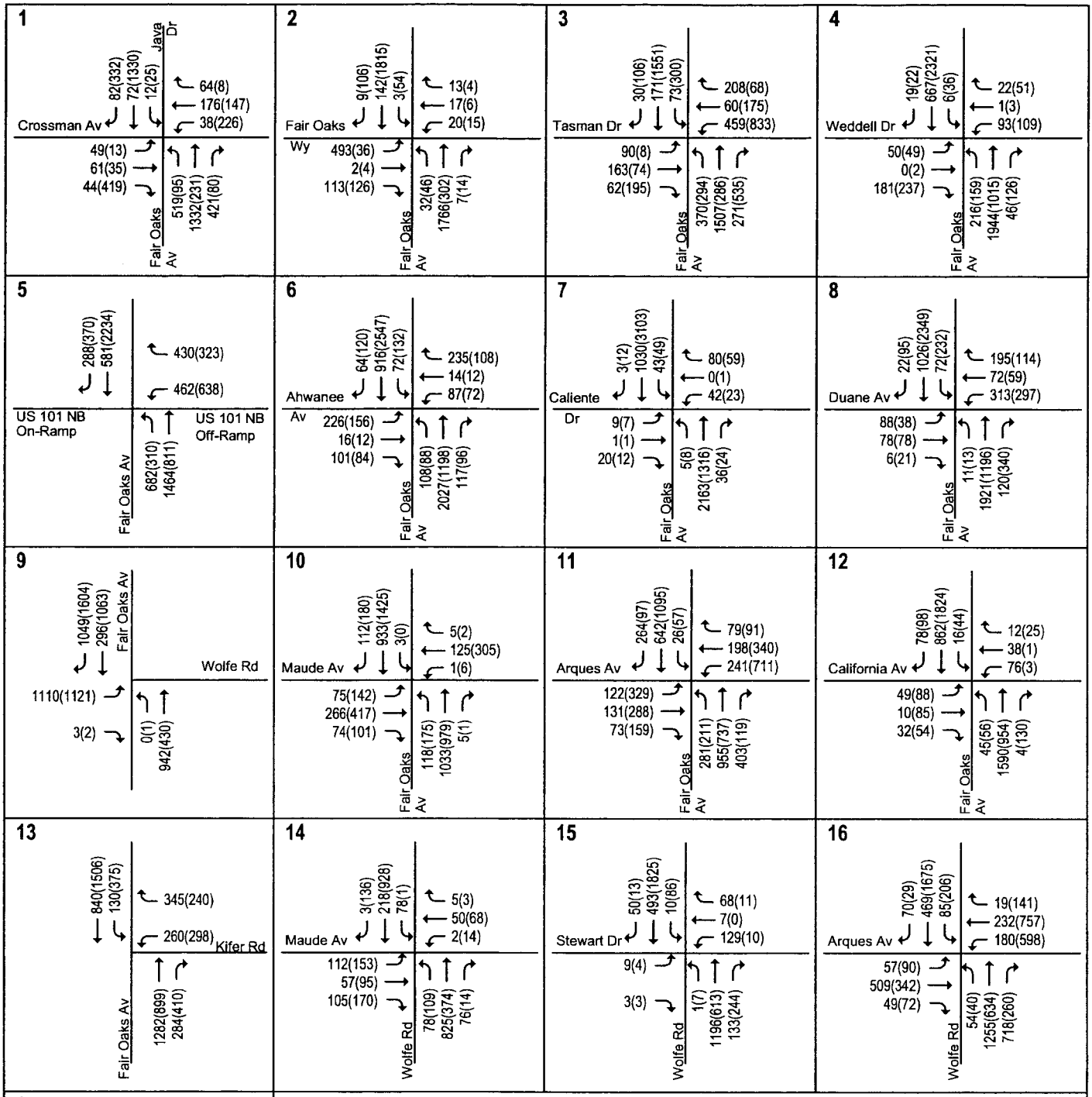
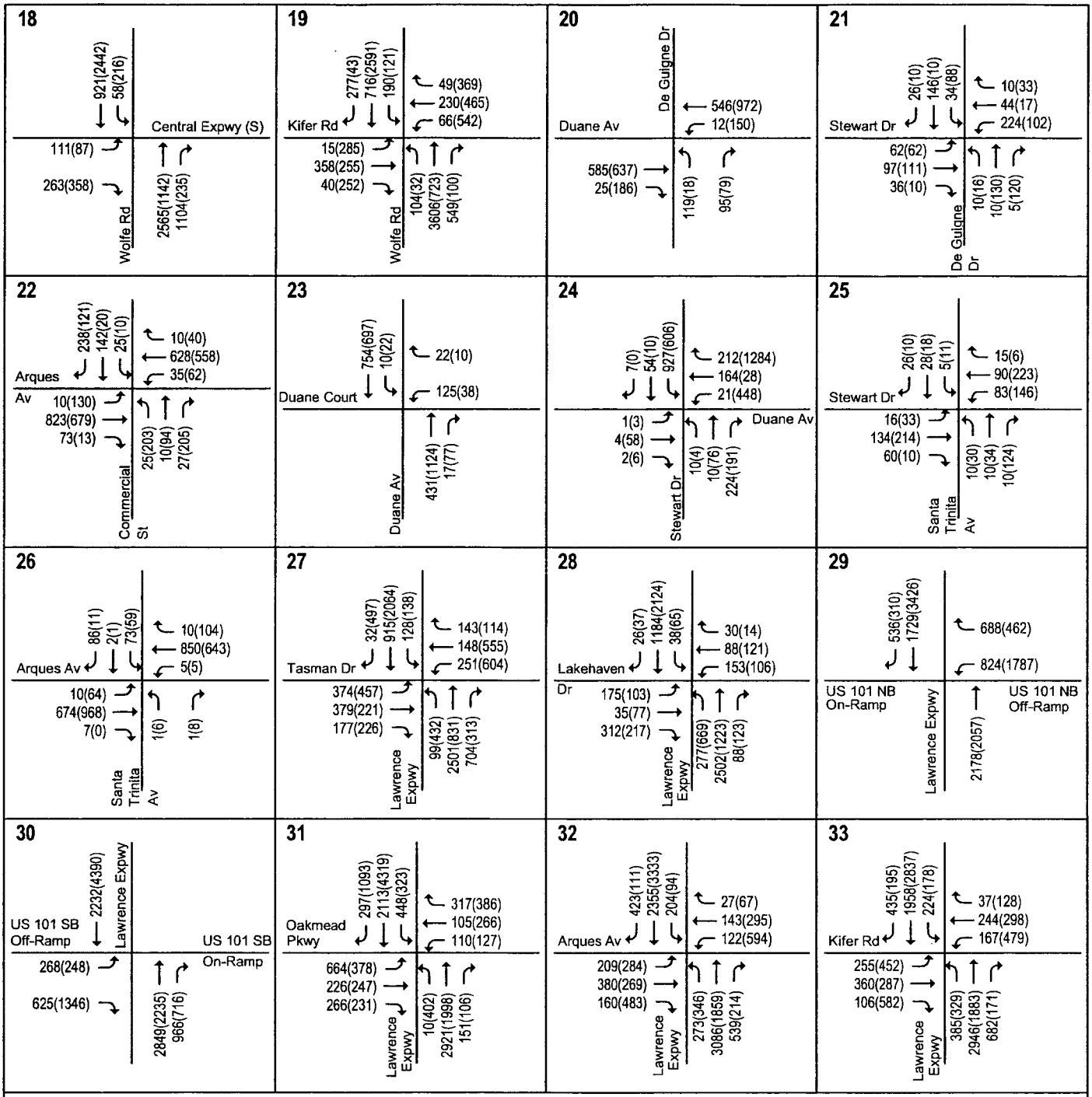



Figure 12

# GPA SCENARIO 1 TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.




## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 12

# GPA SCENARIO 1 TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

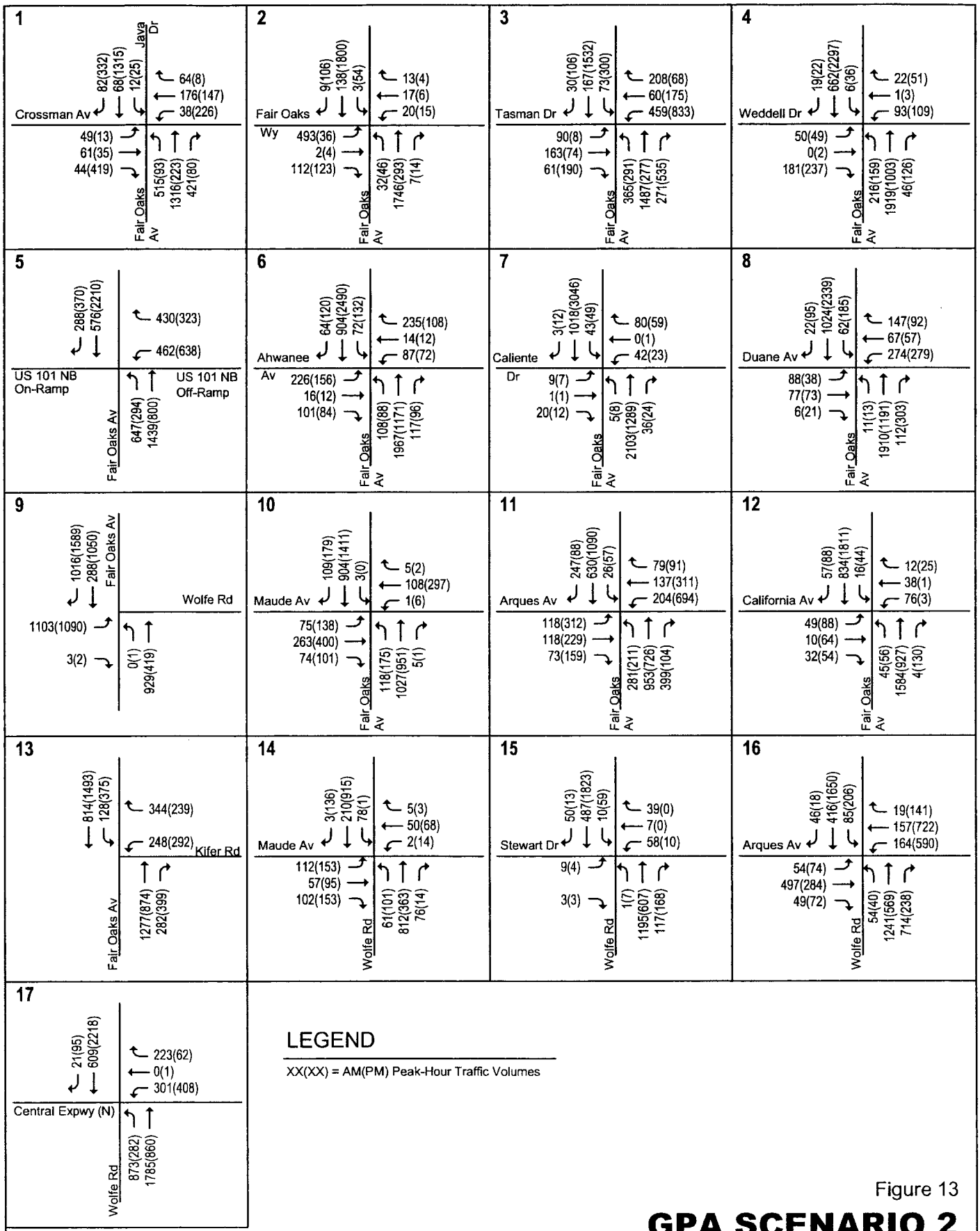
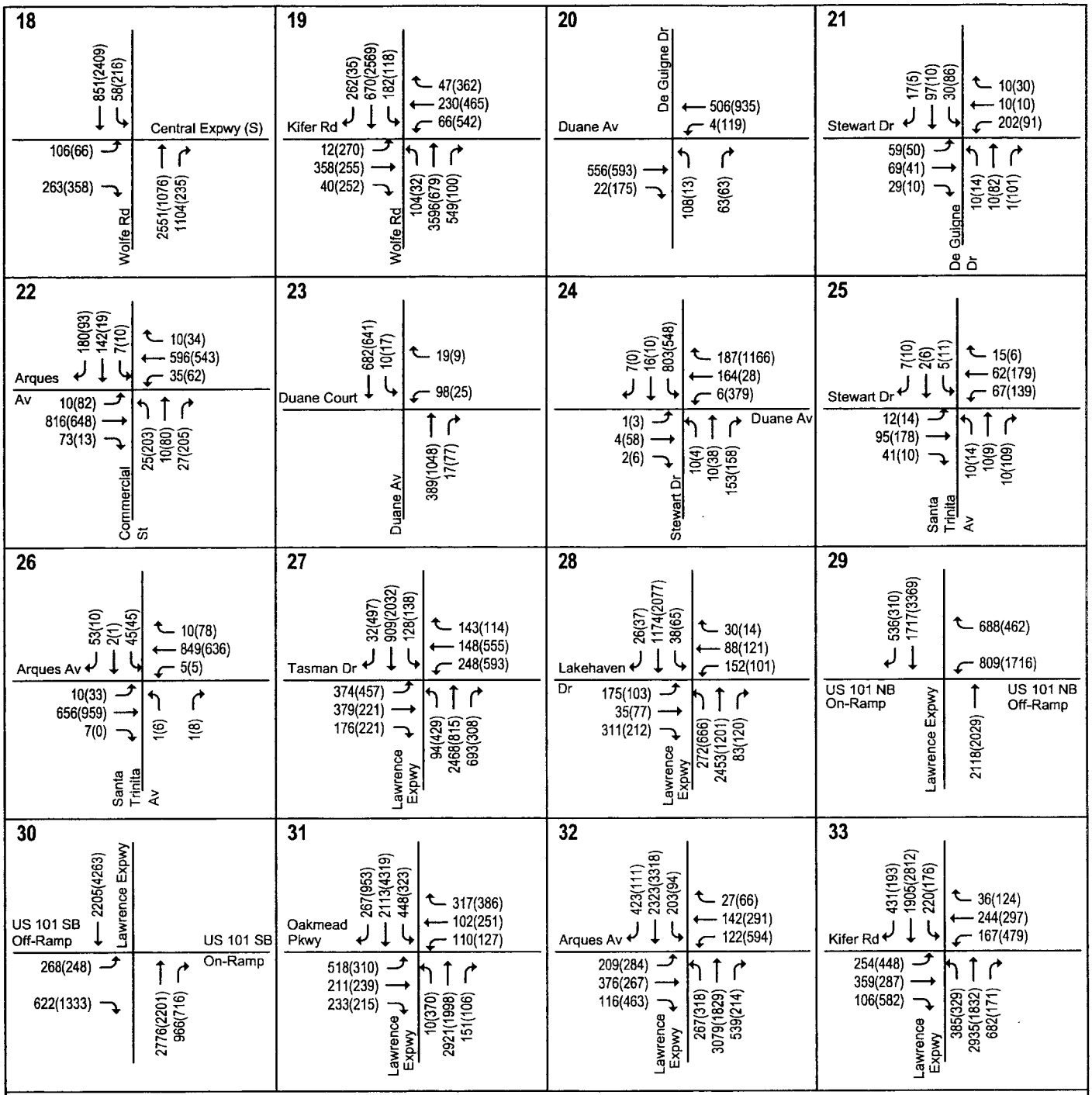



Figure 13

# GPA SCENARIO 2 TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon Transportation Consultants, Inc.




## LEGEND

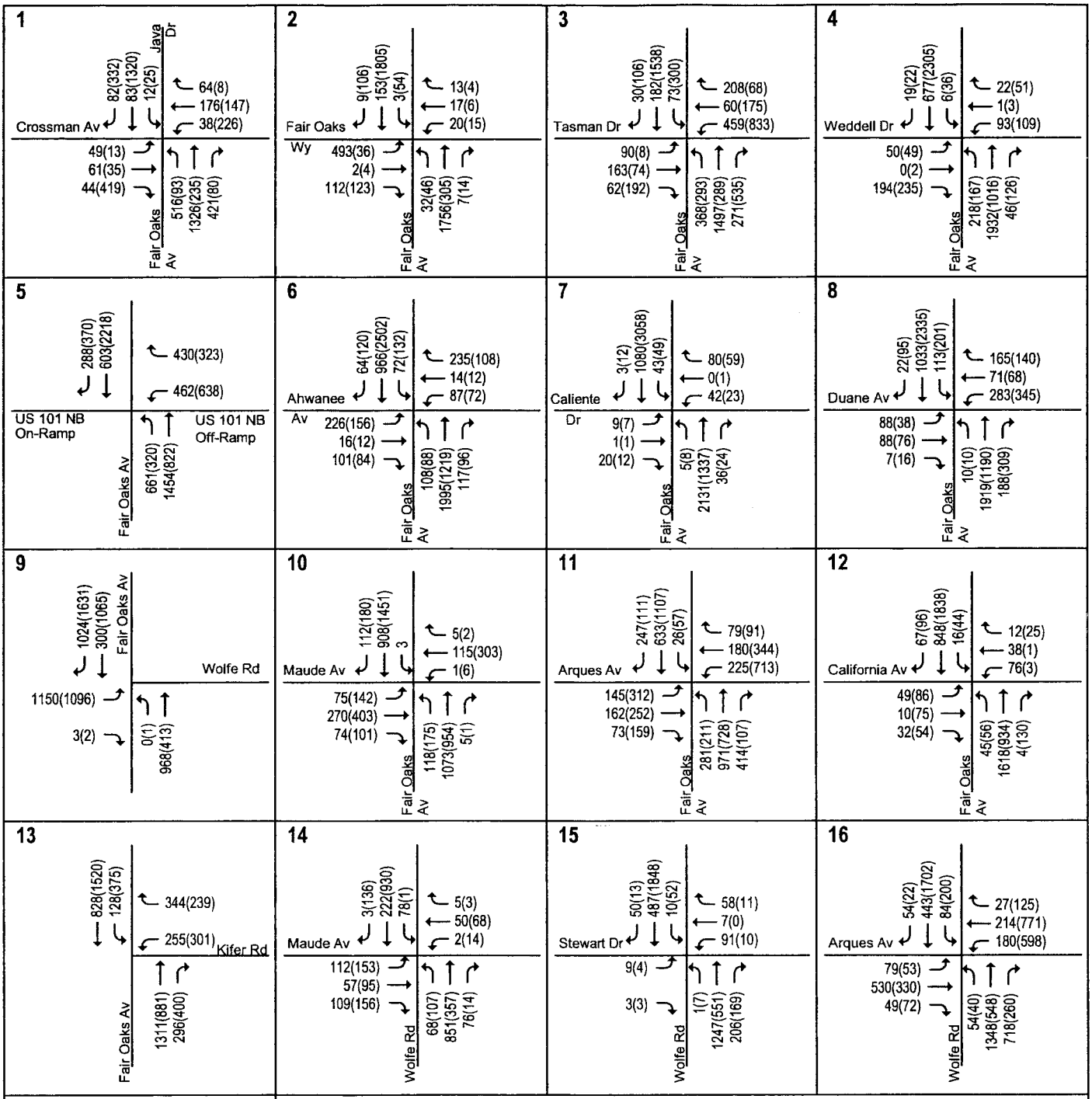
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 13

# GPA SCENARIO 2 TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.




## LEGEND

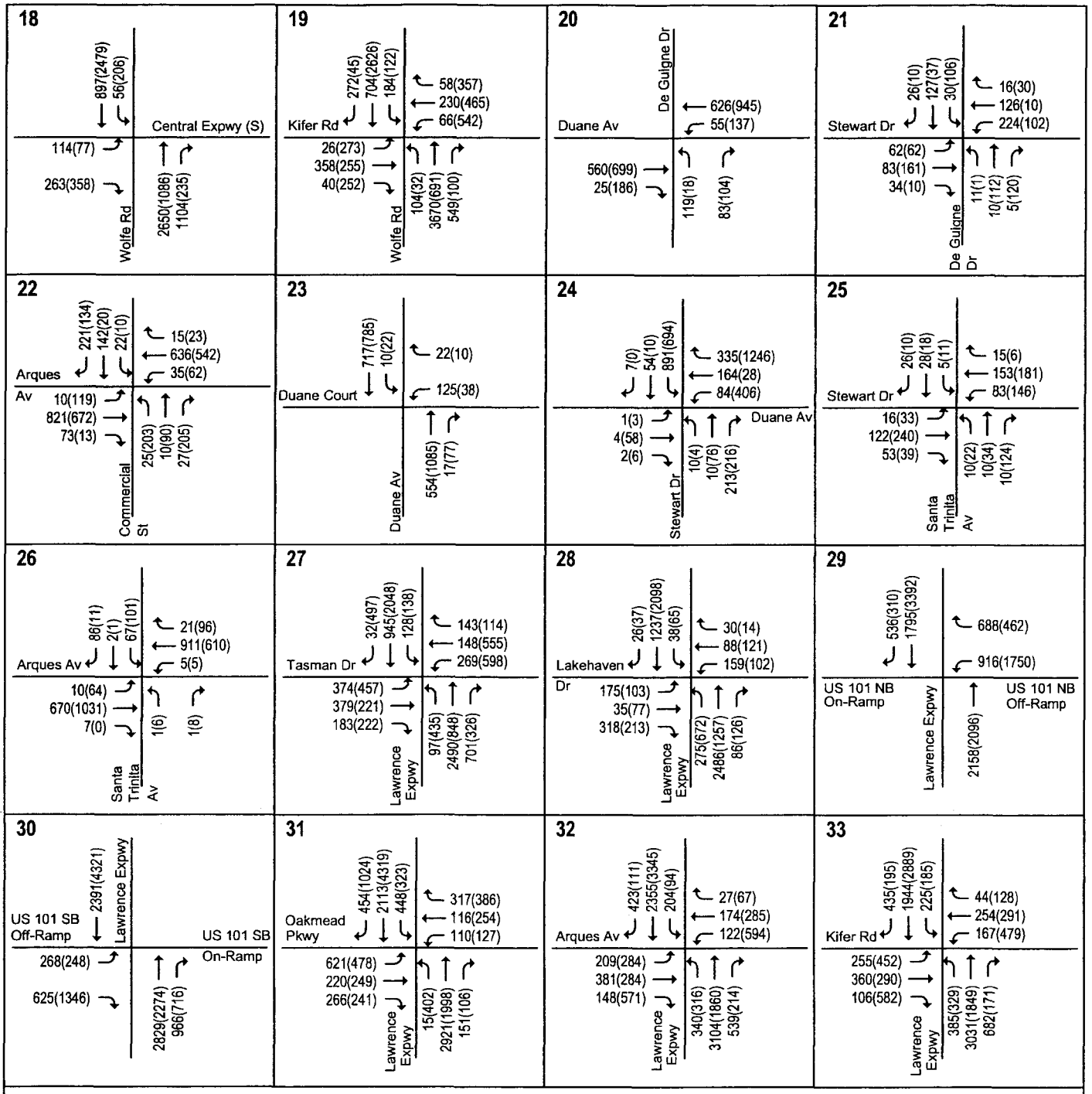
XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 14

# GPA SCENARIO 3 TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon Transportation Consultants, Inc.




## LEGEND

XX(XX) = AM(PM) Peak-Hour Traffic Volumes

Figure 14

# GPA SCENARIO 3 TRAFFIC VOLUMES

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

## Table 8
## Long-Range GPA Intersection Level of Service Summary

| | | 2020 Baseline | | GPA Scenario 1 | | | | GPA Scenario 2 | | | | GPA Scenario 3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Peak Hour | Ave. Delay | LOS | Ave. Delay | LOS | Incr. In Crit. Delay. | Incr. In Crit. V/C | Ave. Delay | LOS | Incr. In Crit. Delay. | Incr. In Crit. V/C | Ave. Delay | LOS | Incr. In Crit. Delay. | Incr. In Crit. V/C |
| Java Dr. & Crossman Ave. | AM | 18.4 | B | 18.2 | B | 0.0 | 0.007 | 18.2 | B | 0.0 | 0.002 | 18.3 | B | 0.0 | 0.005 |
| | PM | 55.3 | E | 57.2 | E | 2.1 | 0.011 | 56.3 | E | 0.9 | 0.005 | 56.5 | E | 1.3 | 0.007 |
| Fair Oaks Ave. & Fair Oaks Way | AM | 29.9 | C | 30.6 | C | 0.7 | 0.010 | 30.2 | C | 0.3 | 0.004 | 30.3 | C | 0.5 | 0.007 |
| | PM | 21.7 | C | 22.3 | C | 0.5 | 0.008 | 22.0 | C | 0.2 | 0.004 | 22.1 | C | 0.3 | 0.005 |
| Fair Oaks Ave. & Tasman Dr. | AM | 29.9 | C | 30.0 | C | 0.2 | 0.010 | 29.9 | C | 0.1 | 0.004 | 30.0 | C | 0.1 | 0.007 |
| | PM | 40.7 | D | 41.7 | D | 1.4 | 0.010 | 41.2 | D | 0.6 | 0.005 | 41.4 | D | 0.9 | 0.007 |
| Fair Oaks Ave. & Weddell Dr. | AM | 13.2 | B | 12.2 | B | -1.3 | -0.017 | 12.1 | B | -1.3 | -0.023 | 12.5 | B | -0.9 | -0.011 |
| | PM | 18.8 | B | 17.9 | B | -1.5 | -0.013 | 17.9 | B | -1.5 | -0.017 | 18.0 | B | -1.2 | -0.012 |
| Fair Oaks Ave. & US 101 NB Ramps | AM | 26.9 | C | 26.8 | C | 0.3 | 0.015 | 26.4 | C | -0.6 | -0.008 | 26.8 | C | 0.1 | 0.008 |
| | PM | 63.8 | E | 62.1 | E | -3.1 | -0.006 | 57.8 | E | -8.8 | -0.023 | 62.6 | E | -2.2 | -0.005 |
| Fair Oaks Ave. & Ahwanee Ave. | AM | 18.4 | B | 19.0 | B | 0.6 | 0.026 | 18.8 | B | 0.2 | 0.008 | 18.7 | B | 0.3 | 0.016 |
| | PM | 14.2 | B | 14.2 | B | 0.0 | 0.020 | 14.2 | B | 0.0 | 0.009 | 14.2 | B | 0.0 | 0.012 |
| Fair Oaks Ave. & Caliente Dr. | AM | 10.3 | B | 10.8 | B | 0.5 | 0.026 | 10.6 | B | 0.1 | 0.008 | 10.6 | B | 0.3 | 0.017 |
| | PM | 8.6 | A | 8.8 | A | 0.4 | 0.020 | 8.7 | A | 0.2 | 0.009 | 8.7 | A | 0.2 | 0.011 |
| Fair Oaks Ave. & Duane Ave. | AM | 36.2 | D | 30.2 | C | -10.0 | -0.090 | 27.7 | C | -13.2 | -0.117 | 31.9 | C | -7.1 | -0.047 |
| | PM | 25.9 | C | 26.7 | C | 11.7 | 0.109 | 24.7 | C | 7.6 | 0.055 | 27.2 | C | 10.9 | 0.090 |
| Fair Oaks Ave. & Wolfe Rd. | AM | 23.8 | C | 23.1 | C | 0.0 | -0.005 | 23.0 | C | -0.5 | -0.018 | 23.7 | C | 0.1 | 0.001 |
| | PM | 29.4 | C | 30.3 | C | 1.0 | 0.004 | 28.5 | C | -1.6 | -0.012 | 30.2 | C | 0.9 | 0.005 |
| Fair Oaks Ave. & Maude Ave. | AM | 31.6 | C | 32.2 | C | 5.3 | 0.051 | 32.1 | C | 5.3 | 0.040 | 32.4 | C | 5.5 | 0.046 |
| | PM | 46.3 | D | 48.3 | D | 3.6 | 0.010 | 45.6 | D | -0.7 | -0.005 | 48.1 | D | 2.9 | 0.009 |
| Fair Oaks Ave. & Arques Ave. | AM | 31.5 | C | 31.6 | C | 8.4 | 0.042 | 29.8 | C | 6.6 | -0.002 | 31.9 | C | 8.8 | 0.043 |
| *With Mitigation* | | | | *30.7* | *C* | | | *29.0* | *C* | | | *30.9* | *C* | | |
| | PM | 56.5 | E | **60.9** | **E** | **4.6** | **0.024** | 54.2 | D | -6.0 | -0.021 | 58.1 | E | -0.3 | 0.006 |
| *With Mitigation* | | | | *49.9* | *D* | | | *46.2* | *D* | | | *48.7* | *D* | | |
| Fair Oaks Ave. & California Ave. | AM | 11.6 | B | 11.6 | B | -0.1 | -0.022 | 11.7 | B | -0.1 | -0.023 | 11.6 | B | -0.1 | -0.013 |
| | PM | 11.7 | B | 12.1 | B | 0.7 | 0.000 | 11.7 | B | 0.1 | -0.013 | 11.9 | B | 0.4 | 0.000 |
| Fair Oaks Ave. & Kifer Rd. | AM | 20.3 | C | 20.9 | C | 1.3 | -0.009 | 20.6 | C | 0.6 | -0.019 | 20.7 | C | 0.8 | -0.005 |
| | PM | 25.2 | C | 24.6 | C | -0.6 | 0.001 | 24.4 | C | -0.8 | -0.010 | 24.7 | C | -0.5 | -0.002 |
| Wolfe Rd. & Stewart Dr. | AM | 8.4 | A | 11.3 | B | 3.3 | 0.059 | 9.1 | A | 0.6 | 0.013 | 9.5 | A | 1.3 | 0.045 |
| | PM | 9.4 | A | 9.6 | A | -0.7 | -0.045 | 9.3 | A | -0.7 | -0.046 | 9.2 | A | -0.6 | -0.041 |
| Wolfe Rd. & Arques Ave. | AM | 33.4 | C | 25.1 | C | -14.4 | -0.074 | 24.6 | C | -15.2 | -0.087 | 25.9 | C | -13.9 | -0.067 |
| | PM | 33.5 | C | 30.3 | C | -4.7 | -0.008 | 29.5 | C | -5.7 | -0.029 | 30.4 | C | -4.7 | -0.030 |
| Wolfe Rd. & Central Expwy (N) | AM | 16.0 | B | 16.8 | B | 0.3 | 0.013 | 16.5 | B | -0.1 | 0.003 | 16.7 | B | 0.4 | 0.009 |
| | PM | 15.4 | B | 15.1 | B | 0.1 | -0.023 | 15.3 | B | 0.1 | -0.027 | 15.2 | B | 0.1 | -0.019 |
| Wolfe Rd. & Central Expwy (S) | AM | 19.6 | B | 19.7 | B | 0.0 | 0.001 | 19.9 | B | 0.0 | 0.001 | 19.6 | B | 0.0 | 0.000 |
| | PM | 15.3 | B | 15.6 | B | -0.3 | -0.032 | 15.6 | B | -0.3 | -0.039 | 15.4 | B | -0.2 | -0.025 |
| Wolfe Rd. & Kifer Rd. | AM | 210.1 | F | 183.9 | F | -30.5 | -0.036 | 184.1 | F | -32.3 | -0.044 | 191.5 | F | -21.3 | -0.026 |
| | PM | 84.8 | F | 76.8 | E | -11.9 | -0.031 | 74.9 | E | -14.0 | -0.037 | 78.4 | E | -9.2 | -0.024 |
| De Guigne Dr. & Duane Ave. | AM | 7.2 | A | 9.2 | A | 1.5 | -0.013 | 8.6 | A | 1.1 | -0.029 | 8.5 | A | 0.9 | 0.008 |
| | PM | 6.1 | A | 3.9 | A | -2.1 | -0.004 | 3.4 | A | -2.5 | -0.027 | 5.0 | A | -1.2 | -0.015 |
| Commercial St. & Arques Ave. | AM | 15.8 | B | 17.7 | B | 1.9 | 0.041 | 16.1 | B | 0.3 | -0.012 | 17.3 | B | 1.5 | 0.027 |
| | PM | 22.0 | C | 22.9 | C | 0.4 | 0.022 | 22.6 | C | 0.1 | 0.003 | 22.7 | C | 0.3 | 0.017 |
| Stewart Dr. & Duane Ave. | AM | 67.3 | E | 20.5 | C | -81.3 | -0.287 | 19.5 | B | -83.0 | -0.346 | 24.4 | C | -71.5 | -0.165 |
| *With Mitigation* | | | | *21.9* | *C* | | | *20.7* | *C* | | | *24.5* | *C* | | |
| | PM | 186.0 | F | **203.6** | **F** | **33.0** | **0.059** | 170.5 | F | -20.0 | -0.062 | **191.8** | **F** | **12.6** | **0.055** |
| *With Mitigation* | | | | *41.3* | *D* | | | *28.4* | *C* | | | *42.2* | *D* | | |
| Santa Trinita Ave. & Stewart Dr. | AM | 18.4 | B | 18.6 | B | 1.2 | 0.003 | 18.1 | B | 0.7 | -0.080 | 18.7 | B | 1.4 | -0.011 |
| | PM | 22.4 | C | 20.8 | C | -2.3 | -0.128 | 20.0 | C | -2.8 | -0.195 | 20.7 | C | -2.2 | -0.090 |
| Santa Trinita Ave. & Arques Ave. | AM | 10.5 | B | 10.7 | B | -0.1 | -0.024 | 10.4 | B | -0.5 | -0.043 | 10.6 | B | -0.1 | -0.009 |
| | PM | 14.5 | B | 9.9 | A | -6.3 | -0.133 | 9.5 | A | -6.6 | -0.145 | 10.8 | B | -4.9 | -0.087 |
| Lawrence Expwy. & Tasman Dr. | AM | 48.9 | D | 48.8 | D | -1.2 | -0.033 | 48.7 | D | -1.4 | -0.037 | 48.8 | D | -0.8 | -0.022 |
| | PM | 63.6 | E | 64.3 | E | -0.9 | 0.004 | 63.7 | E | -1.0 | -0.002 | 64.0 | E | -0.7 | 0.002 |
| Lawrence Expwy. & Lakehaven Dr. | AM | 50.1 | D | 48.2 | D | -2.2 | -0.006 | 48.3 | D | -2.1 | -0.015 | 48.8 | D | -1.4 | -0.003 |
| | PM | 59.7 | E | 62.0 | E | 1.4 | 0.012 | 61.0 | E | -0.2 | -0.001 | 61.1 | E | 0.7 | 0.007 |
| Lawrence Expwy. & US 101 NB Ramps | AM | 18.3 | B | 17.4 | B | -0.2 | -0.002 | 17.5 | B | -0.3 | -0.011 | 17.7 | B | -0.1 | 0.000 |
| | PM | 22.1 | C | 23.7 | C | 2.1 | 0.036 | 22.5 | C | 0.6 | 0.013 | 23.0 | C | 1.3 | 0.023 |
| Lawrence Expwy. & US 101 SB Ramps | AM | 13.1 | B | 12.4 | B | -0.4 | 0.008 | 12.5 | B | -0.4 | -0.004 | 12.5 | B | -0.4 | 0.005 |
| | PM | 37.7 | D | 46.3 | D | 12.7 | 0.035 | 40.9 | D | 4.4 | 0.013 | 43.8 | D | 9.0 | 0.025 |
| Lawrence Expwy. & Oakmead Pkwy. | AM | 45.3 | D | 51.4 | D | 7.5 | 0.053 | 46.7 | D | 0.8 | 0.003 | 49.1 | D | 5.6 | 0.042 |
| | PM | 93.0 | F | 67.6 | E | -43.5 | -0.100 | 59.3 | E | -57.1 | -0.134 | 75.6 | E | -29.0 | -0.066 |
| Lawrence Expwy. & Arques Ave. | AM | 41.3 | D | 37.9 | D | -7.1 | -0.057 | 37.6 | D | -7.4 | -0.065 | 39.1 | D | -4.3 | -0.034 |
| | PM | 97.6 | F | 70.1 | E | -44.7 | -0.149 | 67.6 | E | -49.0 | -0.164 | 80.9 | F | -26.7 | -0.094 |
| Lawrence Expwy. & Kifer Rd. | AM | 40.5 | D | 40.3 | D | -0.2 | -0.044 | 40.2 | D | -0.4 | -0.048 | 40.4 | D | 0.1 | -0.028 |
| | PM | 68.9 | E | 65.4 | E | -5.1 | -0.029 | 65.1 | E | -5.7 | -0.033 | 66.2 | E | -3.8 | -0.020 |

Notes:
* Denotes a CMP intersection.
Significant impacts are shown with an outline.

*Fair Oaks Avenue and Arques Avenue*

**Impact:** The level of service at this intersection would be LOS E under 2020 baseline conditions during the PM peak hour, and the added trips as a result of the long-range GPA Scenario 1 would cause the average critical delay to increase by more than 4 seconds and increase the V/C ratio by more than 0.01. Based on City of Sunnyvale of service impact criteria, this constitutes a significant impact.

**Mitigation:** The level of service impact could be mitigated by providing an exclusive eastbound right-turn lane. The possible mitigation includes reconstructing the eastbound leg of the intersection, which would entail removal of street parking, shifting and reducing the width of the travel lanes, and/or acquiring some right-of-way. Reconfiguring the eastbound leg would involve re-striping and traffic signal modifications. This mitigation measure would improve the intersection level of service to better than 2020 baseline conditions. The estimated cost for these intersection improvements are between $100,000 and $500,000.

*Stewart Drive and Duane Avenue*

**Impact:** The level of service at this intersection would be LOS F under 2020 baseline conditions during the PM peak hour, and the added trips as a result of either long-range GPA Scenario 1 or GPA Scenario 3 would cause the average critical delay to increase by more than 4 seconds and increase the V/C ratio by more than 0.01. Based on City of Sunnyvale of service impact criteria, this constitutes a significant impact.

**Mitigation:** The level of service impact could be mitigated by converting the westbound shared through/right-turn lane into an exclusive right-turn lane, and converting the shared through/left-turn lane into a shared left/through/right lane. This improvement would require signal modifications and re-striping only. No additional right-of-way would be required. This mitigation measure would improve the intersection level of service from LOS F to an acceptable LOS D. The estimated cost for this intersection improvement is $100,000. Project proponents will be required to contribute their proportionate fair share of funds to implement the necessary improvements. If this project is included in the update of the Transportation Impact Fee (TIF), then the mechanism for this contribution could be through payment of the updated Sunnyvale TIF. If the project is not included in the updated TIF, then the mechanism would be a proportionate contribution to the improvement in addition to payment of the TIF.

*Wolfe Road and Stewart Drive*

The level of service at this intersection would be LOS A under 2020 baseline conditions during the AM peak hour, and the added trips as a result of the long-range GPA Scenario 1 would cause the intersection level of service to worsen to LOS B. The City of Sunnyvale has a policy that reasonable improvements be considered if project traffic would degrade the LOS of an intersection by one letter grade. Although the level of service at this location would degrade to LOS B, the intersection would continue to operate very well. It is the opinion of the project traffic consultant that the expense of the improvements necessary to return the intersection LOS to A (additional turn lanes) are not justified by the savings in travel time. For this reason, no further improvements are recommended at this location.

# 6.
# Other Transportation Issues

This chapter presents an analysis of other transportation issues associated with the near-term developments and General Plan Amendment scenarios, including:

- Potential impacts to bike, pedestrian and transit facilities
- Signal warrant analyses
- Potential impacts to the adjacent neighborhood livability
- Site circulation and access
- Parking supply
- Public street layout under GPA conditions

Unlike the level of service impact methodology, which is adopted by the City Council, the analyses is this chapter are based on professional judgment in accordance with the standards and methods employed by the traffic engineering community.

## Pedestrian, Bicycle and Transit Usage

Pedestrian traffic primarily would be generated by residents walking to and from local schools, parks, transit stops, and nearby retail centers. The majority of roadways in the project area currently have sidewalks on both sides of the street, with crosswalks and pedestrian signal heads at all of the signalized intersections. The extensive network of sidewalks within the study area would provide residents with a safe connection between the project sites and the other surrounding land uses in the area.

Many of the roadways near the near-term project sites and in the GPA area contain bike lanes. The street widths and low traffic volumes on the local streets are conducive to bicycle travel. Additionally, the City plans to add bike lanes to Duane Avenue in conjunction with the planned improvements. Because the study area contains a fairly extensive bicycle network, a reasonable and conservative assumption for bicycle commute trip generation would be a one percent mode share. For the near-term projects, this calculates to about one new peak hour bicycle trip in the AM and about two bicycle trips in the PM peak period of traffic. Thus, the near-term residential projects would have very little impact on the existing bicycle facilities in the study area. Under GPA conditions, the peak hour traffic volumes in the project

vicinity are projected to decrease. Correspondingly, the number of commute related bike trips could also be expected to decrease.

Assuming up to three percent transit mode share for the two near-term project sites equates to approximately 3 new transit riders during the AM peak commute period and 5 new transit riders during the PM peak period. These new riders easily could be accommodated by the available ridership capacity of the nearby bus lines. Thus, no major improvements to the existing transit facilities would be necessary with the near-term projects. However, the near-term residential projects would replace light industrial uses, thereby reversing the commute for this site location. Therefore, VTA may consider adjusting the schedules for bus routes 55 and 328 to account for any shift in ridership patterns.

The three long-range GPA scenarios would result in a net decrease in total peak hour traffic levels in the study area. However, the shift in travel patterns as a result of converting light industrial to residential land uses would result in a net increase in traffic levels outbound from the GPA site in the AM peak hour and inbound in the PM peak hour. Based on the projected shift in travel patterns in the study area, it is anticipated that changes in transit ridership will occur under future GPA conditions. Thus, as the light industrial uses are replaced by new residential developments, it is recommended that the VTA reevaluate bus service in the study area and make changes accordingly, particularly for express routes. Changes could include altering the existing bus routes, adding bus routes and stops, and increasing headways.

## Signal Warrant Analysis

Peak hour signal warrant checks (*MUTCD 2003 Edition*, Part 4, Warrant 3) were performed for the unsignalized study intersections to determine whether signalization would be justified on the basis of existing, background, near-term project, 2020 baseline, and GPA peak hour volumes. The analysis revealed that the unsignalized intersection of Wolfe Road and Maude Avenue would warrant signalization based on PM peak hour volumes under existing, background, near-term project conditions, 2020 baseline conditions, and all three of the long-range GPA scenarios.

The City of Sunnyvale ultimately will make the determination as to whether or not signalizing this intersection would be necessary and appropriate. Thus, a more detailed study of this location may be necessary following the City's review of this operational issue. It should be noted that although the unsignalized intersection of Wolfe Road and Maude Avenue would warrant a signal based on existing, background, near-term project, 2020 baseline, and all three GPA scenario peak hour traffic volumes, meeting the Caltrans volume warrant is not considered a significant adverse traffic impact according to CEQA guidelines. The other two unsignalized intersections would not meet the peak hour warrant. The signal warrant sheets are included in Appendix D.

## Neighborhood Traffic Analysis

Daily 24-hour traffic counts were conducted on the following roadway segments during the first week of February 2006 in order to collect average daily traffic (ADT) volumes:

- Duane Avenue, east and west of DeGuigne Drive
- San Miguel Avenue, between Duane Avenue and Amador Avenue
- Santa Paula Avenue, between Coachella Avenue and Amador Avenue
- San Rafael Street, between Barstow Court and Amador Avenue

Based on the tube counts, Duane Avenue experiences ADT volumes of between 10,500 and 11,500 vehicles per day, while the three streets that were counted within the residential neighborhood on the north side of Duane Avenue experience ADT volumes of approximately 1,000 vehicles per day. Daily traffic volumes of 1,000 vehicles per day are typical of local residential streets. The 24-hour tube counts are contained in Appendix A.

Residential areas are especially sensitive to traffic increases because traffic can impact the livability of the street. A concern common to many residents is cut-through traffic due to new developments in the area. Cut-through traffic is defined as non-neighborhood traffic that diverts from arterial and collector streets to local residential streets in search of a faster route. The potential project impact on the neighborhood environment due to cut-through traffic was evaluated for parallel streets within the neighborhood as previously listed. In addition to ADT volume counts, vehicular travel time surveys were conducted along these parallel streets. The results of the neighborhood traffic evaluation are summarized below.

Vehicular travel time was measured between the Duane Avenue/DeGuigne Drive intersection and the Fair Oaks Avenue/Ahwanee Avenue intersection in both directions using four potential routes. According to the travel time survey results, the fastest driving route to and from the project area is via Duane Avenue. The other three "cut-through" routes took between 30 seconds and 1 minute longer than using the more direct Duane Avenue route. Based on the travel time survey, and because these neighborhood routes would require more stops and greater overall distances, it can be concluded that cutting through the adjacent neighborhood would not offer any time savings. Therefore, neither the near-term projects nor the proposed GPA are expected to have a measurable effect on the traffic volumes on neighborhood streets.

## Near-Term Site Access and Circulation

The 250-unit townhouse development would be constructed on the currently vacant 14-acre AMD site located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection. Access to this project site would be provided via Duane Avenue and DeGuigne Drive. The second residential project (Taylor-Woodrow site) consists of a mix of condominiums and townhouses totaling 304 units. This proposed project would replace approximately 111,300 s.f. of existing light industrial uses on a 7.3-acre site located in the northeast quadrant of the Duane Avenue and Stewart Drive intersection. Access to this project site would be provided via Duane Avenue and Duane Court. Figures 15 and 16 show the preliminary site plans for the two proposed near-term projects.

Site access and on-site circulation were evaluated using commonly accepted transportation planning principals. The site access and on-site circulation for both proposed residential developments are discussed below and are based on the preliminary site plans that were available at the time this traffic report was being prepared.

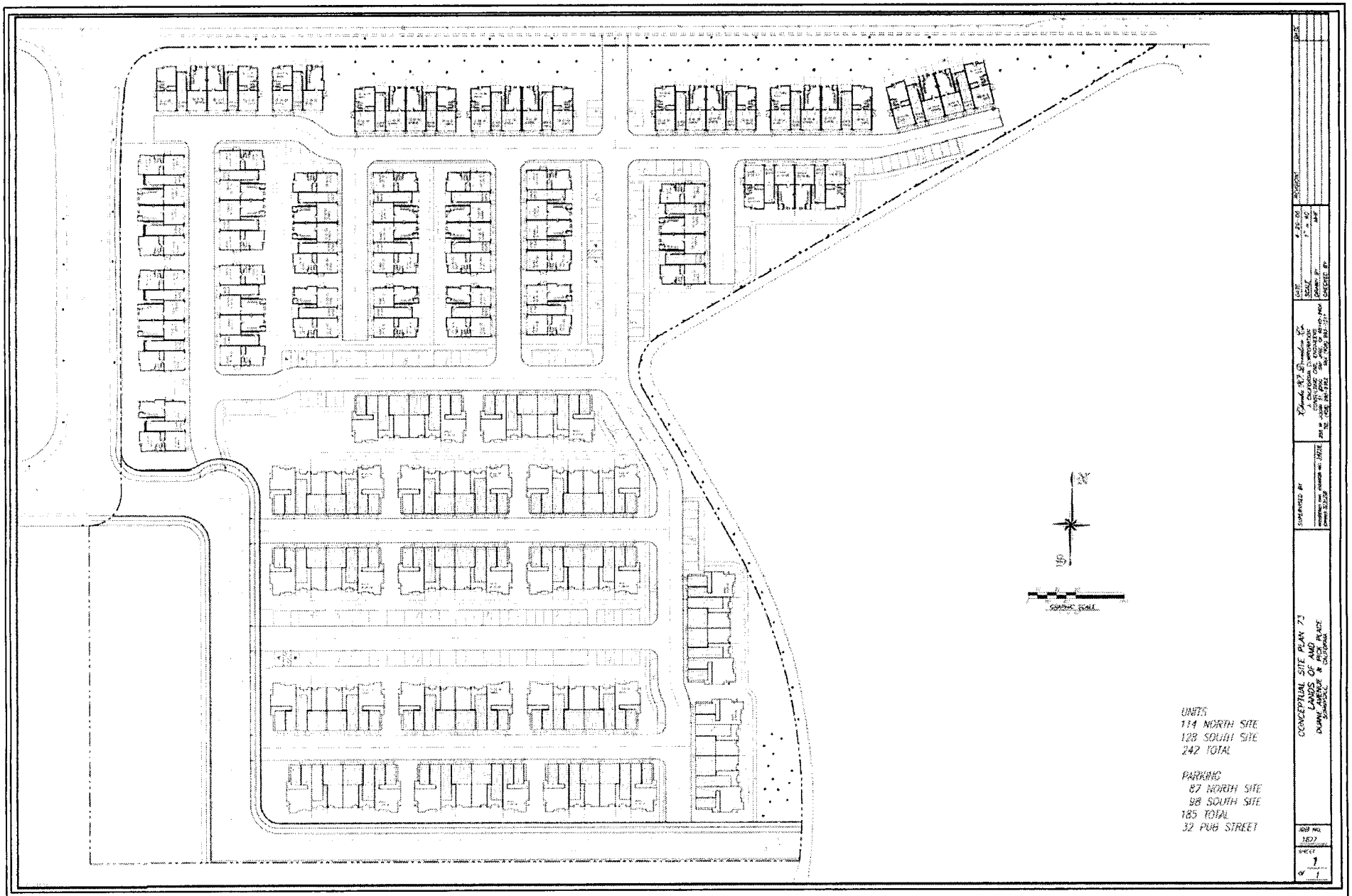



Figure 15

# PRELIMINARY SITE PLAN - AMD SITE

East Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

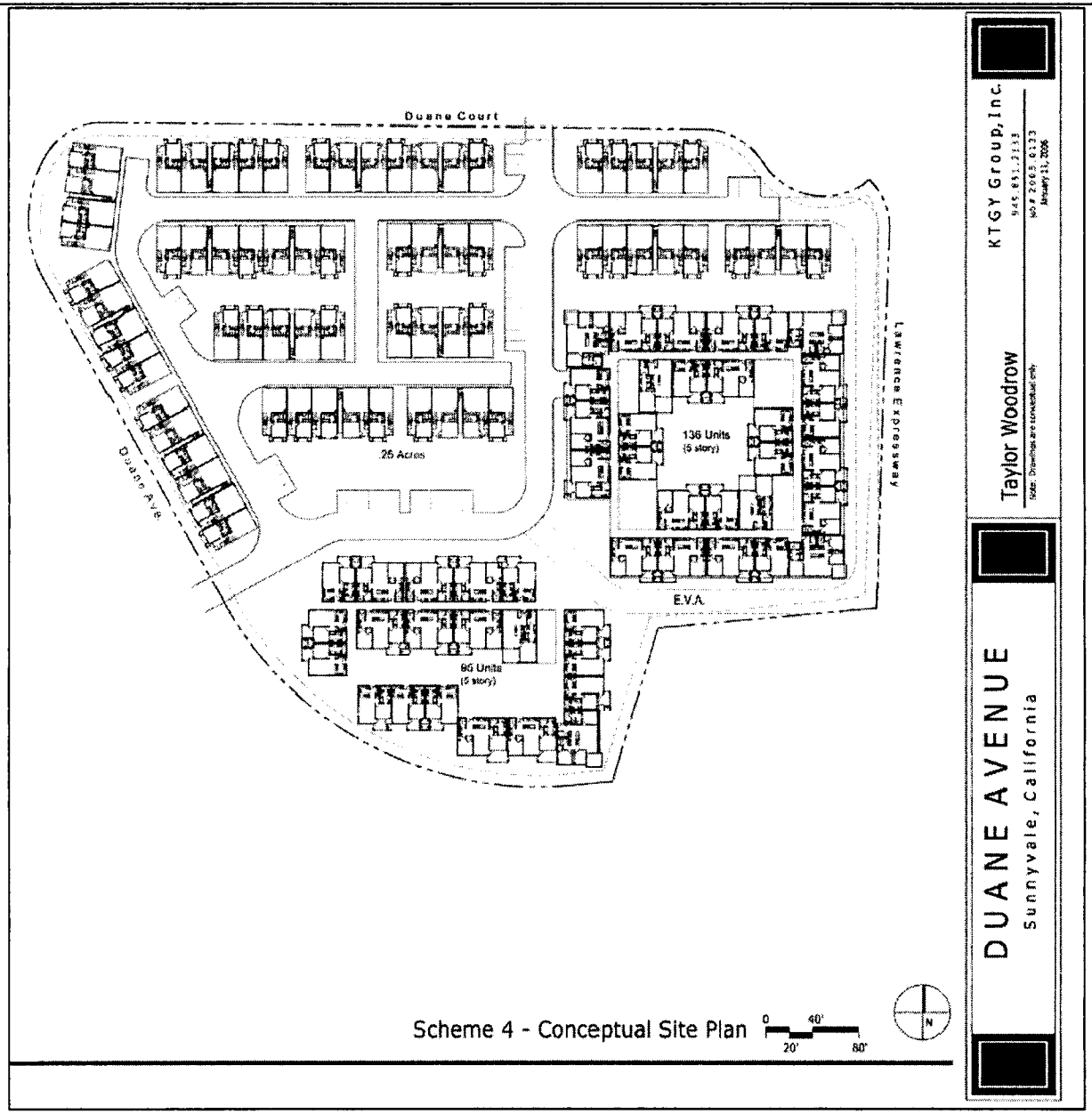



Figure 16

# PRELIMINARY SITE PLAN - TAYLOR WOODROW SITE

East Sunnyvale ITR

### *AMD Site Access*

Access to the 219-unit townhouse development located in the southeast quadrant of the Duane Avenue and DeGuigne Drive intersection would be provided via a total of five driveways. One full access driveway is proposed on Duane Avenue. Vehicles traveling westbound on Duane Avenue and turning left into the site at this location would experience little delay due to relatively low opposing traffic volumes. The proposed project would result in westbound left-turn volumes into the site of approximately 4 AM and 19 PM peak hour trips on Duane Avenue. According to the Transportation Research Board guidelines (*Report 348*, 1992), a dedicated left-turn pocket should be provided where there are more than 12 left turns during the peak hour and the opposing traffic volume is greater than approximately 230 vehicles per hour per lane (vphpl). Thus, it can be concluded that a left-turn pocket on Duane Avenue would be warranted based on PM peak hour volumes under near-term project conditions, 2020 baseline conditions, and all three of the long-range GPA scenarios. The City ultimately will make the determination as to whether a dedicated left-turn pocket would be appropriate at this location.

In addition to the project driveway on Duane Avenue, a new L-shaped public street will be built just south of the Duane Avenue and DeGuigne Drive intersection as an extension to DeGuigne Drive. Four dust pan style driveways will connect the site's internal roadway network to the new street extension, providing access to the southern half of the residential development. As proposed, the project driveways and internal streets measure 26 feet wide. According to the site plan an emergency vehicle access (EVA) point would be provided at the southernmost portion of the site.

#### DeGuigne Drive and New Street Extension

As previously described, a new L-shaped public street will be constructed south of the Duane Avenue and DeGuigne Drive intersection as part of the AMD site near-term project. The City of Sunnyvale has requested that an analysis be conducted to determine whether installation of a multi-way stop sign would be warranted at the new T-intersection on DeGuigne Drive that would be created by the public street. The criteria that apply when considering a multi-way stop sign are outlined in the *2003 MUTCD,* Part 2. The analysis revealed that the new unsignalized intersection would not warrant a multi-way stop sign based on minimum peak hour volumes under near-term project conditions, 2020 baseline conditions, and all three of the long-range GPA scenarios. Additionally, sight distance would be adequate and left-turn conflicts would be minimal at this location. Therefore, based on engineering judgment, the new T-intersection on DeGuigne Drive would be expected to operate adequately without all-way stop control.

### *Taylor-Woodrow Site Access*

Duane Avenue and Duane Court will provide direct access to the 304-unit Taylor-Woodrow condominium/townhouse development, located on the northeast quadrant of Stewart Drive and Duane Avenue. As proposed, the project driveways and internal streets measure 24 feet wide. A limited right-in/right-out only driveway will be provided on Duane Avenue and will provide the primary inbound access to the development. Since only right turns would be allowed from the site at the Duane Avenue driveway, there would be no on-site queuing problems. A second driveway will be provided on Duane Court at the north end of the site and will serve as the primary access for outbound traffic. Inbound traffic on Duane Avenue from the north must turn left into Duane Court and enter the site at the north driveway location. Under most traffic conditions vehicles turning left into Duane Court from southbound Duane Avenue would experience little to no delay. The existing 60-foot southbound left-turn pocket on Duane Avenue would provide adequate vehicle storage for up to 3 vehicles, which is the maximum vehicle queue expected to occur at this location during the peak hours of traffic.

### *Sight Distance*

The project driveways at both project site locations should be free and clear of any obstructions to optimize sight distance. Hexagon recommends that parking be prohibited immediately adjacent to the project driveways to ensure that exiting vehicles can see vehicles traveling on Duane Avenue, Duane Court and DeGuigne Drive. All landscaping and signage should be located in such a way to ensure an unobstructed view for drivers exiting the site.

### *Truck Access and Circulation*

An analysis was conducted to determine the adequacy of driveway access and on-site circulation for both project sites for the truck categories SU 30, which includes small buses, garbage trucks and other single unit trucks, and WB 40, which represents semi-trailer trucks. Based on the truck access and circulation analysis, the driveways and internal roadway widths for both of the proposed residential developments would be sufficiently wide to serve large trucks and emergency vehicles. However, large trucks may have difficulty turning right into the project driveways from Duane Avenue, especially if an exiting vehicle is present. The ITE suggested minimum design for driveways with two lanes is a 35-foot throat width with a corresponding curb radius of 15 feet, which would allow a large truck to enter and a passenger vehicle to exit simultaneously. In general, curb returns with a radii of 15 feet are preferable operationally to "dustpan" style driveways. Therefore, it is recommended that the driveways at both project sites located on Duane Avenue be widened to a minimum of 35 feet, measured at the throat, in order to improve ingress for large trucks and emergency vehicles.

The AMD preliminary site plan shows that the internal roadway network would dead-end at six locations. There are three dead-ends within the proposed Taylor-Woodrow site. Dead-end aisles generally are undesirable for large trucks from a circulation standpoint because upon reaching the end of an aisle, truck drivers must either back out or perform a three-point maneuver. Thus, the dead-end aisles could present a challenge for large trucks during activities such as garbage collection. Although the proposed site plans for both residential developments show dead-ends, the internal roadway networks otherwise would provide efficient on-site circulation for large trucks and emergency vehicles. The Taylor-Woodrow site also would provide additional emergency vehicle access (EVA) along the east portion of the site adjacent to Lawrence Expressway.

## Near-Term Project Parking

Based on the City of Sunnyvale's parking code requirements for condominiums/townhouses, both developments should provide parking as follows:

- 1 bedroom units = 2 covered spaces per unit plus 0.25 unassigned and guest spaces per unit
- 2 bedroom units = 2 covered spaces per unit plus 0.4 unassigned and guest spaces per unit
- 3 bedroom units = 2 covered spaces per unit plus 0.5 unassigned and guest spaces per unit
- 4 or more bedroom units = Add 0.15 unassigned spaces per bedroom per unit to the 3 bedroom requirement

The number of bedrooms for all the units proposed for the near-term project site were not provided. Therefore, a determination as to whether or not the two proposed near-term residential developments would provide adequate parking can not be made. Nevertheless, the amount of parking supplied by the residential projects should meet the City of Sunnyvale's parking requirements, as listed above.

## GPA Roadway Network

A review of the public street network in the GPA study area was conducted to determine whether (1) there is sufficient roadway capacity to accommodate the GPA change and (2) there are adequate possibilities for driveway locations to connect to the public street network. The study area for this analysis is shown in Figure 17.

Under present conditions, GPA study area traffic is primarily served by Stewart Drive, Duane Avenue, and DeGuigne Drive (hereafter referenced as collector streets). These streets collect traffic from the surrounding residential and light industrial uses and distribute it primarily to Lawrence Expressway, Wolfe Road, and Fair Oaks Avenue (hereafter referred to as major streets). As shown in the LOS calculations, under GPA Scenario 1 conditions (worst-case), there is adequate capacity at all of the intersections between the collector streets and the major streets. In some locations, the intersection LOS actually improves as a result of the GPA. For example, the level of service at the intersection of Lawrence Expressway and Oakmead Parkway would improve from LOS F to LOS E during the PM peak hour under all GPA scenarios.

At the internal intersections of Duane Avenue/DeGuigne Drive, and Santa Trinita Avenue/Stewart Drive, the level of service would be LOS C or better under GPA Scenario 1 conditions during both the AM and PM peak hours. At the intersection of Stewart Drive and Duane Avenue, minor mitigation under GPA Scenario 1 conditions would improve the intersection to LOS D from LOS F under 2020 baseline conditions. Thus, all of the intersections internal to the GPA area would comply with City level of service standards. This occurs primarily because GPA Scenario 1 would decrease the net peak hour traffic volumes in the GPA area. In the AM peak hour, net traffic on the collector streets would be reduced by 1,084 trips. In the PM peak hour, net traffic on the collector streets would be reduced by 259 trips. Thus, because (1) the highest volume intersections in the GPA area would operate in compliance with the City of Sunnyvale LOS policy and (2) the proposed GPA would reduce peak hour traffic on the internal collector streets, then from a traffic capacity perspective, the public street network as presently configured would be adequate to handle the proposed GPA.

Access to the collector streets from the light industrial uses is currently provided primarily by a series of stop controlled driveways. Given the relatively low traffic volumes on the collector streets, these driveways operate with minimal overall delays. With the proposed GPA, this type of street access also would be adequate. However, it would be desirable from a traffic operations perspective to designate the main access points to the GPA sites to insure proper driveway spacing, proper sight distance, minimize driveway delays, and minimize City maintenance. A recommended driveway access strategy for the parcels included in the GPA is shown in Figure 17. Please note that this is a discussion of the approximate locations of primary access to the collector streets and that secondary access driveways could also be provided, where appropriate.

Generally, properties should be encouraged to provide access to DeGuigne Drive, which is the lowest volume collector street in the GPA area. This will help to reduce the number of vehicle conflicts at unsignalized driveways. The GPA plan also should encourage projects to make use of the existing traffic signals in the area, as opposed to building new traffic signals. In addition to improving left-turn access into the sites, this will help reduce the annual maintenance costs associated with new traffic signals. Combined parcel access may be accomplished by creating new public streets or joint access agreements between the properties. Connectivity between the residential projects also is highly desirable and should be encouraged. This is especially important for bike and pedestrian facilities. One property of note is parcel #3. Currently, the intersection of Duane Avenue/Stewart Drive has a less than ideal geometry,

## East Sunnyvale ITR Study Area

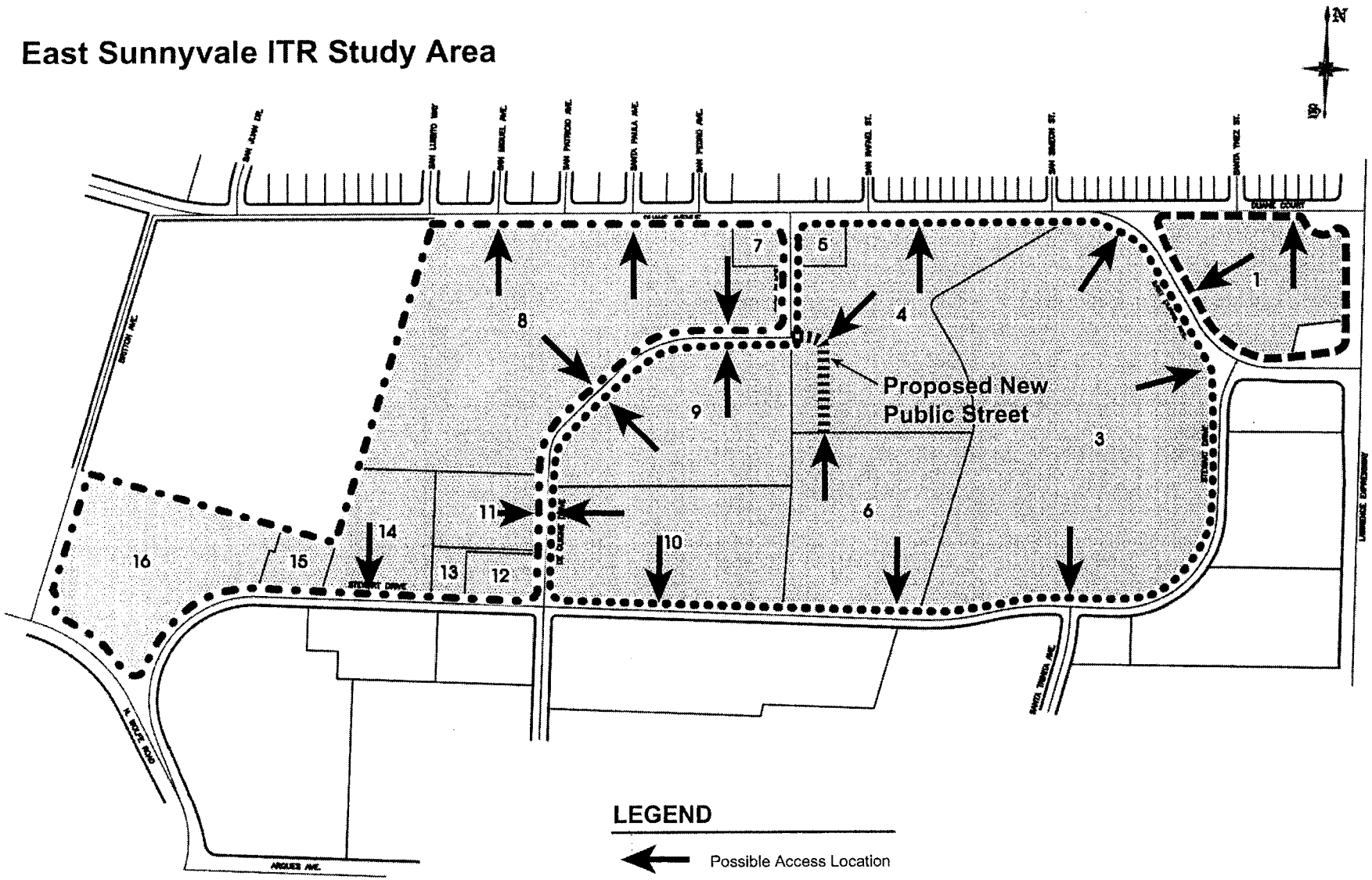



Figure 17

# POTENTIAL GPA ACCESS STRATEGY

Sunnyvale ITR

Hexagon
Transportation Consultants, Inc.

which results in somewhat inefficient signal timing (split phase required). As an alternative to providing signalized access to parcel 3 at the west let of the Duane Avenue/Stewart Drive intersection, access could be provided via a new traffic signal at the intersection of Duane Avenue/Duane Court. The determination of which option is preferable is beyond the scope of this analysis, but should be considered as a future design and operations study in conjunction with the buildout of the area.

It is important to note that the traffic analysis for the GPA scenarios assumed the total conversion of the project area from industrial uses to residential and retail uses. However, this transition is likely to occur slowly over many years. As a result, there are many combinations of industrial parcels mixed with residential parcels that were not included in this analysis. For this reason, it is possible that interim traffic impacts may occur with the conversion of individual parcels that would not occur in the aggregate. Moreover, the combined parcel access previously described may not be possible for a given project until an adjacent parcel is developed. To insure that traffic operations in the interim conditions are adequate, it is recommended that each future project as part of this GPA conduct its own near term traffic impact analysis.

**NOTE:** **THE APPENDICES TO THIS REPORT ARE ON-FILE WITH THE COMMUNITY DEVELOPMENT DEPARTMENT**